THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

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Notre Dame Gives M.P. to High Schools

Finances METAL PROGRESS and REVIEW Subscriptions to Acquaint Boys With Metallurgy

By E. G. Mahin

At its annual meeting in May the Notre Dame chapter voted to finance subscriptions to METAL PROGRESS and to THE REVIEW for all of the high schools in its territory.

It is believed that many of the boys who graduate from high school, and who look forward to entering some engineering field, have only a vague idea of the nature of metallurgical work, as to the type of study necessary for training in this field, or as to the opportunities open to trained metallurgists. This is an understandable situation. Mechanical, electrical, civil and chemical engineering are fairly old and well developed fields, and they are reasonably familiar in nature to almost everyone. Even aeronautical engineering, although a comparatively new branch of engineering, has attracted much attention, partly because of its somewhat spectacular character.

Metallurgy is an ancient art but a rather young science and the average individual who is not in some way connected with metallurgical enterprises does not appear to be very familiar with even the meaning of the word.

Literature of technical, or semi-technical, character in other branches of engineering is available—and fairly familiar—to almost everybody, but this cannot be said of metallurgical literature. It was the expressed feeling of the Notre Dame Chapter that if a suitable metallurgical publication could be placed in the libraries of the high

(Continued on page 4)

'38 Congress to Be in Detroit

Detroit is the city selected for the 20th National Metal Congress and Exposition, it was announced by Managing Director W. H. Eisenman at the Convention in Atlantic City last month.

The Congress will be held the week of Oct. 17 to 21, 1938.

Graves Opens Cleveland Season With Auto Talk

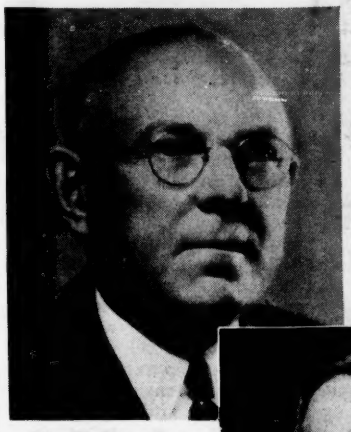
By H. D. Churchill

Cleveland Chapter opened its 1937-38 season on Monday, Oct. 4, with a dinner at the Cleveland Club attended by some 175 members and guests followed by a technical meeting with a capacity crowd of around 500.

The speaker of the evening was W. H. Graves, chief metallurgist of the Packard Motor Car Co., Detroit, who spoke on the "Selection of Metals for Automobile Parts."

With the use of several slides Mr. Graves brought out the fact that for any given automobile part there were several metals which could be used to give satisfactory results, the choice being governed by the shop practice where the part was made, price, and availability of the material.

New Officers and Trustees of A.S.M.



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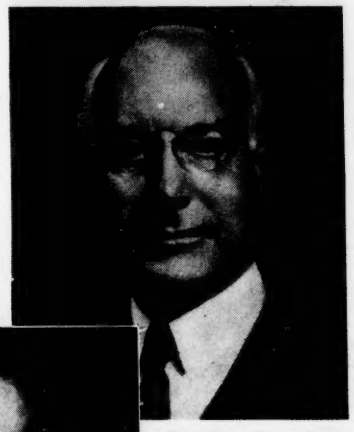
Vice-President



Bradley Stoughton
Treasurer

G. B. Waterhouse
President
American Society for Metals

J. P. Gill
Trustee

H. A. Anderson
Trustee

Newly Elected Officers of the A.S.M. Were Installed at the National Metal Congress Last Month. President Waterhouse is professor of metallurgy at Massachusetts Institute of Technology; Vice-President Woodside is also vice-president of Climax Molybdenum Co.; Treasurer Stoughton is dean of engineering, Lehigh University; James P. Gill is chief metallurgist, Vanadium-Alloys Steel Co.; and H. A. Anderson is metallurgical engineer, Western Electric Co. Other officers are W. H. Eisenman, secretary; and R. L. Wilson, O. W. Ellis and E. C. Bain, trustees

Emmons Traces MoMax Development At Syracuse Meeting

By William G. Slack

Syracuse Chapter started the 1937-38 season with a well-attended dinner at the Onondaga Hotel.

Chairman H. H. Mattison opened the business meeting with a description of the educational course to be given by the Chapter on "Fundamentals of Ferrous Metallurgy," as outlined by A. A. Bates.

The main event of the evening was a talk by J. V. Emmons, chief metallurgist of the Cleveland Twist Drill Co., on "High Speed Steels."

After a brief historical sketch, Mr. Emmons described the various tungsten and molybdenum compositions with notes as to their uses and heat treatment. The speaker's description of the development of MoMax was of particular interest.

The address was followed by a lively discussion which centered around liquid bath versus muffle furnaces for hardening high speed steel. No definite conclusion was reached but a great deal was learned of the advantages and disadvantages of each method.

Mr. Emmons presented some very excellent photomicrographs of high speed steel after various treatments.

Compliments

To **Theodore Wiedemann**, founder of the metallurgical library, Philadelphia Chapter, enthusiastic sponsor and lecturer for the educational courses at Temple University, on the presentation made to him on Oct. 1 of a "Certificate of Outstanding Achievement" by Temple University.

To **Climax Molybdenum Co.** on having secured the services of **Ralph L. Wilson**, formerly of Timken, a present trustee of the A.S.M.

To **Paul Lane**, chairman of the Baltimore Chapter, on the presentation of a talk on Nov. 12 before the Metropolitan Philadelphia Chapter of the American Foundrymen's Association.

To **Harry P. Coats** of Firestone Steel Products Co. on being awarded the gold medal of the American Electroplater's Society for the best paper on electrodeposition during 1936.

To **Kotaro Honda**, honorary member of the A.S.M., president of Tohoku Imperial University, Sendai, Japan, on receipt of the newly created "Cultural Order of the Rising Sun," a Japanese equivalent of the Nobel Prize.

4000 Attend Courses Given By Chapters

Many Educational Courses Sponsored by National Office; New One Available on Open-Hearth Steel Making

Nearly 4000 men attended 46 educational courses sponsored by 26 chapters of the American Society for Metals during the 1936-37 season. The majority of these men either were already members or joined the Society upon taking the course, and represent 43½% of the total membership.

These courses varied widely in subject matter and method of presentation. Many of them, however, were based on courses available in printed form and accompanied by lantern slides supplied by the National Office. Subjects of these courses are as follows:

"Fundamentals of Ferrous Metallurgy," by A. A. Bates, Westinghouse Electric & Mfg. Co. (formerly at Case School of Applied Science).

"Tool Steels," by James P. Gill, Vanadium-Alloys Steel Co.

"Principles of Heat Treatment," by M. A. Grossmann, Carnegie-Illinois Steel Corp.

"Physical Testing of Metals," by H. D. Churchill, Case School of Applied Science.

A fifth course on "Open-Hearth Steel Making," by Earnshaw Cook, American Brake Shoe and Foundry Co., is also now available for presentation by the chapters this fall and winter. This course is a series of five lectures presented daily during the National Metal Congress last month.

It is the fourth of such lecture courses to be presented at a Metal Congress, all of them having proven very successful. A second course of three lectures on "Metallographic Technique," by J. R. Vilella, United States Steel Corp. Research Laboratories, was also presented during the Congress.

The tabulation on pages 8 and 9 gives an analysis of the courses presented last season and an indication of what is planned for this year.

Inspection and Typical Failures Are Discussed

By J. H. Birdsong

Buffalo Chapter — Norman Deuble, metallurgist, Canton-Massillon District of Republic Steel Corp., was the speaker at the first technical meeting of the 1937-1938 season on Sept. 16.

Mr. Deuble's subject was "Metallurgical Inspection of Steel."

The forepart of Mr. Deuble's talk covered a number of the metallurgical tests applied to automotive and aircraft steels. Such tests as macro-etch, nonmetallic inclusions, tensile, impact, and hardness penetration were discussed. The value of these tests for specific applications was considered.

The latter part of Mr. Deuble's talk covered some typical failures of steel in highly stressed parts.

The speaker demonstrated the cause of failure for each example used. He emphasized the necessity of proper design and very smooth surfaces on many automotive and aircraft parts.

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Mangaging Editor*

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Record Crowd of Chicagoans Pay Visit To Carnegie-Illinois

Group of 950 Is Handled With Ease on Impressive Tour of South Works

By David R. Howerton

Chicago Chapter—An outstanding event in the activities of the Chapter this fall was the inspection tour of the South Chicago Works, Carnegie-Illinois Steel Corp.

Nearly 950 members and guests, by far the largest group to take part in a Chapter activity or to visit the Works, braved the dismal weather to enjoy a most interesting and educational tour of the plant.

The tour included the bessemer shop, where two furnaces were in operation. The blown metal was subsequently added to the tilting open-hearth furnaces for the duplexing process.

Blast furnaces and basic open-hearth furnaces were observed with great interest by the majority of the crowd, who had never before witnessed such a spectacle.

The alloy bar mill and the structural mill were visited and, both being in operation, proved to be most interesting spots.

The complete success with which the entire tour was carried out is a direct result of the careful planning of George Ferry, assistant division superintendent of rolling, who so ably handled the arrangements at the Works. It was only through careful planning that such a large crowd could be handled with ease.

Talk on Physical Metallurgy at Boston Emphasizes Purpose of A.S.M. Chapter

Boston Chapter—An intensely interesting coffee talk was given by Prof. Alfred C. Lane, president of the American Geological Society, at the first meeting of the season on Oct. 1 at Massachusetts Institute of Technology.

His subject was "Does Mother Earth Show Her Age?" He outlined briefly how disintegration products of various heavy atoms are used to measure the age of the earth and arrived at a figure of 750 billion years.

The regular meeting was prefaced by a short talk by Chairman H. H. Lester (reprinted in this issue, page 11).

Dr. Robert S. Williams of M.I.T. gave the address of the evening, defining physical metallurgy and the place of practical metallurgy in industry.

Physical metallury is so broad no one man could be proficient in all of its branches. The college professor, the steel maker, the heat treater, are all fellow craftsmen in this broad field. No individual can be expert in all of its ramifications, but all should have a knowledge of the general field.

Technical societies such as the A.S.M. are designed to keep the steel treater, the college professor, the steel salesman, and the steel melter, acquainted with the field as a whole.

This talk was designed primarily to give a broad background for the talks that are to follow, and to emphasize the thought that the A.S.M. represents an association of fellow craftsmen, one purpose of which is the advancement of the dissemination of the knowledge of the science of metals among the men who work in this field.

Tisdale Treats Subject of Molybdenum in Four Parts

By Horace Hoch

York Chapter—The 1937-38 lecture series started off with a rush as Norman Tisdale informally met the Chapter members at dinner on Sept. 22.

Mr. Tisdale's capable presentation divided his subject into four parts. He started with the effect of molybdenum on iron in increasing its machinability and wear resistance, and as an aid to nitriding operations, and next pointed out its functions in steel, stressing its value as an anti-creep agent, reminding us that it is next to carbon in inducing strength, and that its intensifying effect for other alloys is a most valuable property. The third section covered the chemical effects of molybdenum, and Mr. Tisdale's closing remarks enumerated the miscellaneous uses to which molybdenum is being applied, using the fine-grained Amola steels as one illustration.

Letters to the Editor

PAPERS SUPERSEDE SPECTACLES

Sir:

Referring to THE REVIEW, August 1937, pages 6 and 7, I must exclaim with Marcellus upon beholding the ghost of Hamlet's father,

"Who art thou that usurps this
time of night
Together with that fair and war-
like form. . . ."

The portrait captioned No. 85 excites the outburst.

Reluctant as I am to deprive the meeting of a single celebrity, I am more reluctant to let cock robin soar in the guise of an eagle.

Handsome, scholarly Professor Stoughton may recognize the spectacles, but I recognize the papers held in No. 85's hands. He was the next speaker on the program, no other than your humble servant, J. H. G. Williams

HE VAS DERE

Sir:

Yes, I "vas dere." I am No. 89 on page 7 of the August REVIEW.

P. Wedlake

MORE IDENTIFICATIONS

Sir:

Complying with your suggestions, permit me to offer two corrections. I believe the following corrections are in order.

No. 101 should read D. S. Wolcott, Jr., now vice-president, Lukens Steel Co., Coatesville, Pa., at that time connected with the Crucible Steel Co. of America.

No. 103 was the writer, who was sitting in the same row next to Mr. Wolcott, and directly in front of W. H. Plage, all three of us Crucible Steel Co.

J. P. Jayme

CORRECTION!

Sir:

In the personal columns of THE REVIEW for August there was an article about the writer in which there are some statements which are not correct.

I am chairman of the Toledo Chapter and past chairman of the Detroit Chapter of the American Society of Tool Engineers, rather than of the American Society of Metals, as was stated in your article. O. W. Winter

Gleanings . . .

. . . *from the chapters*

On Top

With a total membership now topping the 10,000 mark, representing a 30% gain over 1936—the largest gain of any year in A.S.M. history—and with all activities booming in proportion, Secretary Eisenman was undoubtedly justified in proclaiming this the "Mt. Everest" of A.S.M. years in his report given before the Annual Meeting of the Society in Atlantic City Oct. 20. . . . The only thing that worries us is how he is going to describe the coming year should it turn out to be even more successful (a very likely possibility)!

Getting the Gong

Another event of the Annual Meeting was the award of the President's Bell—this year to the Philadelphia Chapter. Retiring President Bain cited the Chapter not only for excellent educational work but also "for a sustained quality of excellence maintained at a mark set some ten years ago. . . ." Past Chairman and Past National President W. B. Coleman accepted for the Chapter (photograph on page 6).

Candid Camera Thwarted

There were many more interesting photographs we would like to have published had space permitted—particularly one showing new President Waterhouse being greeted by New Jersey's Governor Hoffman; another of the Baldwin-Southwark booth at the Show, in which were greatly enlarged reproductions of the cover and advertising index of our favorite magazine, METAL PROGRESS.

Ask Me Another

A new service to members is being inaugurated by both the Springfield and Hartford Chapters. This is a "Question Box" which will be at hand at all meetings to receive any questions which members would like discussed further. Special discussion meetings will be held to answer them.

Sympathy

J. H. Birdsong, secretary, extends the sympathy of the Buffalo Chapter to Chairman G. F. Roeder, who recently buried his father in Missouri and immediately after received notice of the death of his mother.

A.S.M. + Buick = 51

Fifty-one employees of the Buick Motor Co. are members of the Saginaw Valley Group, reports Charlie Foreman, chairman. This seems to us like some sort of a record or other.

Pedagogics

Want to know what the Chapters are doing in the way of educational activities? See pages 8 and 9—an impressive showing!

Nine Hundred and Fifty Chicago Members Visit Steel Plant

Chicago Chapter Turned Out in Full Force to Break the Record for the Largest Group Ever to Inspect Carnegie-Illinois's South Works

Dinner Meeting of New York Chapter Oct. 8

Members of the New York Chapter Enjoyed an Excellent Dinner at the Annual Party and Officers Night of the Chapter Held Oct. 8 at the Building Trades Club

Cincinnati Greeter Committee Welcomes Strangers, Attracts New Members

"Say, Bill, I spent a really enjoyable and most profitable evening yesterday at the regular monthly meeting of the Cincinnati Chapter, A.S.M. I had heard about their dinners, coffee talks and lectures for some time past but somehow I could never muster up the courage to go. You know how it is, Bill; I didn't know anybody there and couldn't get anyone to go with me from the shop even.

"Greeter" Brumble

"I wanted to hear that lecture awfully bad though; it was right up my alley. I didn't know what to do; but finally I says to myself:

"'Jack! you are going, and you are going to treat yourself by attending not only the lecture, but the dinner and coffee talk also! What if you do have to sit there by yourself till they get started—take the evening paper along and read awhile.'

"Greeter" Friedlein

"But did I get a surprise! When I entered the hotel lobby almost the first guy I ran into was a fellow with a badge on his coat reading: 'Greeter Committee, Cincinnati Chapter, A.S.M., F. J. Elliott.' And did that fellow have a smile on him!

"I introduced myself and he gave me full particulars on where the meeting room was and how to get there. Oh, yes, and he said, 'Now when you arrive at the dining room door, just ask for Harry Friedlein.'

"But I didn't have to do that, Bill; I saw him right away because he, too, wore a badge like Elliott did. (Funny how soon you leave off those first initials.) And besides that he was all over the place getting fellows acquainted with one another.

"Somehow he spotted me as a first-nighter almost immediately, mind you, without my having to introduce myself or anything—what do you think of that, Bill?

"It was but a few minutes before I had met several of the boys there, including the chairman of this here 'Greeter Committee'—a fellow by the name of M. H. Brumble. He took me around to some of the officers of the Chapter, and, say, when it came time to eat you'd a thought I was amongst old friends. I never did get to read the paper.

"And talk about two interesting speeches—I wouldn't have missed them for anything! How about going with me, Bill, next month?"

(Incidentally, Jack and Bill joined the Chapter unsolicited after the second time there.)

Norton Plays Host For Big Meeting of Worcester Chapter

Worcester Chapter—Inspection trips, motion pictures, a free dinner, and two technical talks constituted the program for the meeting on Oct. 7. Norton Co. was host to the Chapter for all of these activities, and is to be complimented on the excellence of the program.

Inspection trips through the Norton factories started at 2:00 p.m. and were followed at 5:45 by two motion pictures, "The Alchemist's Hourglass" and "Norton Abrasives at Work."

The complimentary dinner in the Norton Cafeteria was one of the best ever enjoyed by the Chapter members. (This was not entirely due to the fact that it was free!)

The evening technical session was opened by words of welcome from H. K. Clark, vice-president of the company. C. W. Henson then gave a talk on "Refractories for High Temperatures."

In heat treating furnaces, the hearth provides some of the most difficult problems. High thermal conductivity in the hearth will result in more uniform, less dangerous and quicker heating of large and expensive work, and silicon carbide refractories are becoming more and more widely used for this purpose.

In muffle furnaces heat resisting alloys are limited in application because of a limiting operating temperature of about 1800° F. Silicon carbide does not have such temperature limits, but is occasionally susceptible to oxidation.

There is considerable demand today for refractories that can be used from 2600 to 3300° F. in the processing of tungsten and other high melting point substances. Those supplied are almost without exception fused alumina.

The second talk, by A. O. Rousseau, concerned "Grinding of Hard Metals." The metals discussed were hardened tool and die steels, stellite, and cemented carbides.

Magnesium First Produced in 1830 Gann Tells Members

By George E. Stoll

Notre Dame Chapter—The first meeting of the new season was held on Oct. 13 with Dr. John A. Gann, chief metallurgist of The Dow Chemical Co. of Midland, Mich., speaking to an audience of 75 people on "Magnesium and Its Alloys."

Dr. Gann presented a comprehensive review of the magnesium industry, describing the first production of the metal in 1830 through the production in America during the War up to its present status.

His description of the development of commercial magnesium alloys, which are known as Dowmetal alloys, was illustrated by a number of slides. Some of these slides compared the physical properties of these alloys with other light weight metals and steel, while others showed the changes in microstructure with additions of alloying elements and with heat treatment.

Other slides were presented to illustrate current foundry and shop practice, and the final group pictured many of the larger commercial articles made from Dowmetal.

In addition, Dr. Gann brought with him many small parts such as die castings, extruded shapes and rolled plates, all of which were examined with interest by the audience after the lecture.

Following the talk Dr. Gann entered into a lively discussion with many of the members, answering their questions and talking with them of the economic aspects of this new industry, foreign developments and local shop practice.

Grossmann Talk Strains Seating Capacity at Pitt

By G. R. Fitterer

Pittsburgh Chapter—The increase of the chapter's membership to a record high was evidenced at the meeting on Sept. 9 when the seating capacity of the auditorium was strained to the limit.

Dr. M. A. Grossmann, Carnegie-Illinois Steel Corp., Chicago, always attracts a large audience in Pittsburgh and this meeting was no exception. His survey of the various processes for the manufacture of alloy steels induced lively discussion.

Differences particularly between the acid and basic practices for making alloy steels were discussed, and because of the large number of the membership in this field in Pittsburgh, many of the important factors in melting practice received particular attention.

Lecture Given By Pioneer in Nitriding Field

William Moody Discusses Some of Problems Encountered for Golden Gate Chapter

By C. W. Horack

Golden Gate Chapter held its first fall session on Sept 20 at the Athens Club in Oakland, Calif. At the conclusion of the dinner, the group was entertained for half an hour by Si Edwards of the Industrial Steel Treating Co., who gave an illustrated talk on a recent trip to the High Sierras.

Si seems to be quite an enthusiast for taking photographs of the great outdoors and it was interesting to see and be reminded of some of the beauty spots in our California mountains.

Chairman Jim Coulter gave a brief résumé of the contemplated program for the coming year, and announced the plan of having various members of the Executive Committee serve as program chairmen at the different meetings.

The program for this meeting was in charge of William M. Moody, of Besler Systems, Oakland, Calif. Being more or less of a pioneer in the field of nitriding in this part of the country, Mr. Moody chose to give a talk on "Nitriding Alloys and the Nitriding Process."

Reviewing briefly the alloy steels best adapted for nitriding, and the results desired, the speaker discussed many of the difficulties encountered in carrying out the nitriding process on various machine parts.

Sealing Methods Are Problem

Among some of the problems encountered were those of maintaining uniformity of case in all parts, deterioration of the nitriding container, and methods of sealing.

Of the various methods used for sealing containers, Mr. Moody found that asbestos cement gave most satisfactory all-around results. For heating small and medium sized lots of work, gas firing was found to be most economical.

Where parts were tinned by dipping to keep certain sections of a part soft, it was found that in most cases the tinning was excessive. Part of the tin volatilized and interfered with the process.

Container Materials Unsatisfactory

Many kinds of materials, such as Nichrome, Inconel, Monel, and 18-8 stainless steel, were tried out for containers, none of which proved entirely satisfactory in all respects. Enamel-lined boxes seem to be quite satisfactory but are subject to chipping off of the enamel in production work, whereafter corrosion takes place rapidly.

Various nitrided parts were exhibited. It was stated that the first 0.002 in. of the case is the most important and should be retained as far as possible.

Parts to be nitrided should be machined to size and then lapped back to size after nitriding.

Wherever soft threads are desired, the threaded section should be left over size, ground down after nitriding, and then threaded.

Mr. Moody then spoke of nitri-cast-iron, a comparatively new material on the Pacific Coast. The physical properties, methods of casting and uses were explained, with special reference to the manufacture of valve guides and cylinder liners for internal combustion engines.

Tools in Mass Production Get Close Control

Many Pointers Given on Forging and Heat Treating of Various Tool Steels

By J. W. McBean

Ontario Chapter—At a large and enthusiastic opening meeting in Hamilton on Oct. 1, the Chapter had as guest speaker John A. Comstock of the Illinois Tool Works, Chicago, whose subject was "Treatment of High Speed Steels from the Tool Manufacturer's Point of View."

Many good, simple tools have been made with an ordinary blacksmith's fire, but the results are uncertain and when we undertake mass production and want about 1000 similar cutters to give uniformly good results it is necessary to control many factors.

It is good practice to cut off both ends of a bar and inspect the sections. In a cross-section deep etching may show porosity or dirt inclusions and these might cause breakage in service.

In a longitudinal section slits or seams may be revealed which would result in forging bursts.

If the depth of decarburization in these sections is examined, it gives an idea how large a cutter can be made from the bar.

Forging

Forging is used to change the direction of the grain, as well as to assist in refining it.

Because of decarburization, however, present practice is to limit the amount of forging and depend to some extent on the manufacture of the bar for a suitable grain.

Forging of 18-4-1 tool steel is started at 2100°F. and stopped about 1600° F., and the steel then allowed to cool in *draft-free* air, which gives a Rockwell hardness of about C-50.

If drafts are present the hardness will be too great, while with extremely slow cooling there is excessive separation of the carbides.

Heat Treatment and Composition

The 18-4-1 variety may then be box annealed over night, with a nearly neutral mixture of high speed steel chips and carbonaceous material in a temperature range of 1500 to 1700° F. depending on the time cycle used. In the molybdenum variety the temperature range would be 1475 to 1650° F.

In the 18-4-1 variety the tungsten and chromium form oxides which help to protect the steel from decarburization, but in the cobalt and molybdenum varieties decarburization is more apt to occur.

In the molybdenum steel this can be largely overcome by dipping the steel in a saturated borax solution which is melted by the preheat and forms a skin coat.

Even with this, however, atmospheric control is important in order to avoid pitting or decarburizing. On this account the semi-muffle furnace does not give good results on this steel.

For the 18-4-1 variety the preheating may be done at 1550° F., and the final heating in a controlled atmosphere at 2350° F., giving sufficient time to come to temperature. The atmosphere protects the surface, but the time required is greater than in the semi-muffle furnace because the heat is put into the steel by radiation only.

In the semi-muffle furnace the heating is more rapid due to washing of the gas over the steel and also to oxidation of the steel, which may raise the temperature above that of the furnace. This results in damage to the surface and increased grain size unless the temperature of the furnace is kept down to 2300 or 2325° F.

Molybdenum steel should be treated in a controlled atmosphere at 2200° F., using borax as mentioned.

Special emphasis should be laid on the tempering operation to get not only a suitable hardness, but also the proper microstructure. The temperature should be controlled within 5° F. In this way it is possible to get better cutting performance and greater resistance to breakage.

John F. Keller, "Learned Blacksmith" And Well-Known Educator, Dies at 76

Cornell Dean, Two Baltimore and Two Indianapolis Men Are Other Recent Deaths

JOHN F. KELLER, the "Learned Blacksmith," beloved educator who had the happy facility of elucidating the technical aspects of steel heat treatment in such a way that the man in the shop could listen and understand, died Oct. 27 at the venerable age of 76, after an illness of seven months.

Mr. Keller was born in Ireland and came to America at the age of 9. Grade school constituted the extent of his formal education.

Serving his apprenticeship as a blacksmith, John Keller developed a keen curiosity to learn the "why" of all things that happened to steel during forging, hardening and tempering. Limited by a somewhat meager education, he found the road long and hard, but eventually his eager search for knowledge brought him to the position of instructor of forging and heat treatment of iron and steel at Purdue University.

Here he developed the series of lectures which brought him fame under the sponsorship of the American Society for Metals and the Engineering Extension Department of Purdue University. These lectures were presented in many cities during the years 1927 to 1930 and attracted a large attendance. The lectures were finally published in book form by the A.S.M. and have attained a wide circulation.

As president of the Steel Treating Research Society in 1920, Mr. Keller was also instrumental in its consolidation with the American Steel Treaters Society to form the American Society for Steel Treating, later changed in name to the American Society for Metals.

Up until eleven months ago he was still active as steel specialist in the Engineering Extension Department of Purdue University.

* * *

HERMAN DIEDERICHS, 63, dean of the College of Engineering, Cornell University, Ithaca, N. Y., died August 31, 1937. Dean Diederichs suffered from a rare case of anemia and died when a minor operation failed to heal.

Coming to America as a poor German immigrant, he followed a career which led to the highest post in one of America's great engineering colleges. He has been identified with Cornell for 44 years as student, teacher, and since 1936 as dean.

He was an authority on materials of engineering and is co-author of a textbook which is a standard in the field. He is also co-author of a monumental work on mechanical experimental engineering.

One of the very active members and one-time officer of the Southern Tier Chapter of the A.S.M., he was also a member of the Society of Automotive Engineers, the Society for the Promotion of Engineering Education, and the German Society of Engineers, and was chairman of the Board of Honors and

John F. Keller

of the Nominating Committee of the American Society of Mechanical Engineers for 1936.

* * *

MATTHEW SCHON, steel mill engineer of Baltimore, Md., died suddenly at his home on August 29 after a brief illness.

He was best known for his work in laying out and supervising the new cold reduced tin mill of Crown Cork and Seal Co., where he put into operation some novel and revolutionary ideas that have aroused national interest. This project was well described by Mr. Schon before the Baltimore Chapter last May.

Mr. Schon, 46 years old, was educated in New York City, received his M.E. degree at Columbia and taught mathematics at Columbia and at Miami University for a short time.

He was treasurer and sales manager of Crown Cap Co. until its merger with Crown Cork and Seal Co., when he became development engineer on projects for that company in the United States and Europe, later being commissioned to make a survey and establish a modern tin mill at Baltimore.

He was a brilliant engineer with vision and keen judgment, many of his original ideas being far ahead of present-day steel mill developments.

* * *

HERBERT CHARLES BALLORD, past chairman of the Baltimore Chapter A.S.M., and for the past eight years branch manager of the Baltimore office of the Crucible Steel Co. of America, died on Oct. 22.

Born at Ashford, Kent County, England, 58 years ago, Mr. Ballord came to the United States as a child and settled with his parents at Syracuse, N. Y. He has been connected with Crucible Steel Co. for 30 years and was widely known among businessmen in New York State and later in the South.

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GRANT GOODWIN, 30, district representative in Indianapolis of the Lindberg Engineering Co., died Sept. 14 of a fractured skull suffered in an automobile collision. He was vice-chairman of the Indianapolis Chapter of the A.S.M.

Mr. Goodwin was graduated from Arsenal Technical High School, Indianapolis, and attended Butler and Purdue Universities. He had been formerly connected with Allison Engineering Co. and Muehlhausen Spring Co.

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HENRY JOSEPH JOYCE, JR., district sales manager for the Carpenter Steel Co., died on August 3, 1937. Mr. Joyce was representative on the sustaining membership of the Carpenter Steel Co. in the Indianapolis Chapter of the Society.

Philadelphia Holds Annual Exhibit and Educational Meeting

Work at Temple University Is Recognized; Bain and Eisenman Are Speakers

By M. M. Kennedy

Philadelphia Chapter — On Friday evening, Oct. 1, the Chapter held its annual Educational Meeting and Exhibit at Temple University.

The 41 exhibits by industrial concerns included demonstrations of methods and equipment used in metallurgical testing and research, and features of outstanding scientific interest in the metallurgical field.

At the dinner preceding the meeting Dr. Stauffer, assistant to the president of Temple University, welcomed the Chapter, and conferred upon our well-known member, Theodore Wiedemann, an honorary certificate of proficiency in metallurgy.

Charles E. Metzger, director, Extramural Division of Temple University, and Bill Eisenman, national secretary, spoke at the dinner.

At the evening meeting, Charlie Stoeckle, chairman of the Philadelphia Chapter, and Horace C. Knerr, director of the Temple Course, officiated, and after a few remarks by Mr. Metzger and Mr. Eisenman, the speaker of the evening, National President E. C. Bain, was introduced.

Dr. Bain presented a paper on "Hardenability of Steel," and as usual it was one of those able talks for which he is so well known.

As a result of the cooperation of all concerned, Temple University and the Philadelphia Chapter have put across the educational work to such an extent that the course enrollment has had to be limited, and at the present time plans are under way to hold a laboratory class on Saturday morning—the only remaining period available.

Local Schools Get Metal Progress and Review Subscriptions

(Continued from page 1)

schools, and thus made available to high school students who are expecting to enter college and to take up engineering work of some character, many of them might be attracted and interested.

It was felt also that no more appropriate publication than METAL PROGRESS could be found for this purpose. Many of its articles may be read—and at least fairly well sensed—by one who has little or no metallurgical training. It is superbly illustrated and its general assembly, even including advertisements, is such as to attract interest.

THE REVIEW also is included in the subscription. This little newspaper of the A.S.M. will add its bit to the general information concerning metallurgical happenings.

The Notre Dame Chapter feels that it should receive a modest share of credit for its investment and it therefore attaches to each issue of each publication a sticker, reading as follows:

The subscription to this publication has been provided by the Notre Dame chapter of the American Society for Metals, for the purpose of stimulating interest in study in the field of Metallurgy.

Eight high schools are involved in the action of this Chapter. These include five schools in South Bend and one in Mishawaka, Ind., also one each in Niles and Buchanan, Mich. The authorities of these schools accepted the subscriptions and expressed appreciation.

HERE AND THERE WITH A.S.M. MEMBERS

A.S.M. TRUSTEE RALPH L. WILSON, formerly metallurgical engineer of the Timken Steel & Tube Division of Timken Roller Bearing Co., has become associated with the Climax Molybdenum Co. in the capacity of metallurgical engineer in its development field.

R. L. Wilson

A reliable contributor to A.S.M. technical sessions, Mr. Wilson is author and co-author of numerous articles and technical papers dealing chiefly with the metallurgy of steel for high temperature applications.

In addition to his A.S.M. activities, he has for many years been active in A.S.T.M. committee work on steels for high temperature service and is a member of the Refining Division of the American Petroleum Institute.

Mr. Wilson was graduated from Lehigh University in 1921, served on the metallurgical staff of the United Alloy Steel Corp. from 1921 to 1926 and with its successor, the Central Alloy Steel Corp., until 1928. He then was appointed assistant metallurgical engineer of the Timken Steel & Tube Co., becoming metallurgical engineer of the same company in 1933.

Mr. Wilson will make his headquarters in the Canton, Ohio, office of the Climax Molybdenum Co.

* * *

R. LAPELLE has recently joined the staff of the Gas Machinery Co. as a furnace engineer.

Mr. LaPelle was formerly associated with the Westinghouse Electric & Mfg. Co. in charge of the Industrial Heating Engineering Division, and has likewise been associated with the Salem Engineering Co. and the Philadelphia Drying Machine Co.

FOUR personnel changes in the metallurgical department of the American Steel & Wire Co. involve A.S.M. members:

J. R. THOMPSON, appointed assistant manager of the metallurgical department at Cleveland, has done some exceptional work in the development of special types of wire. He has worked for American Steel & Wire since 1901, starting as an assistant in the laboratory at the Newburgh Steel Works, and working his way up to successive positions as chief chemist at Central Furnaces, district metallurgist in Cleveland, and division metallurgist.

L. H. DUNHAM, now district metallurgist in Chicago, has been with the company for 21 years, having been district metallurgist in Cleveland since the early part of 1937.

R. H. BARNES, who takes over Mr. Dunham's former position in Cleveland, has had 17 years' service with the company and is moved up from assistant district metallurgist.

R. R. LEO, made assistant division metallurgist at Cleveland, has been serving the bolt trade in the Cleveland district for the past year. He has been with the company since 1935.

* * *

THE faithful service of AXEL WEYDELL as treasurer of the Indianapolis Chapter of the Society since 1928 is recognized and deeply appreciated by the officers and members of the Chapter.

Axel Weydell

Mr. Weydell, who is with the P. R. Mallory & Co., has been a willing helper at all times in the activities of the Chapter and has been particularly capable in taking care of the financial end of the organization.

DISTINGUISHED authority on steel making, particularly the chemical reactions which occur in liquid steel and open-hearth slag, JOHN CHIPMAN has been appointed professor of metallurgy at the Massachusetts Institute of Technology. Dr. Chipman comes to the Institute from the American Rolling Mill Co., Middletown, Ohio, where he has been associate director of research since 1934.

John Chipman

Dr. Chipman is a native of Tallahassee, Florida, and received his bachelor of science degree from the University of the South in 1920, and his master of science degree from the State University of Iowa in 1922. For the following two years he was assistant professor of chemistry in Illinois Wesleyan University, and in 1924 was appointed a teaching fellow at the University of California, which awarded him his doctorate in 1926.

That year he was appointed assistant professor of chemistry in the Georgia School of Technology, teaching there until he joined the staff of the University of Michigan as a research engineer in 1929.

Dr. Chipman is at present a member of the Publication Committee of the A.S.M., and was awarded the Howe Medal in 1934 for his TRANSACTIONS paper on "The Application of Thermodynamics to the Deoxidation of Liquid Steel."

* * *

WILLIAM P. WOODSIDE, JR., son and namesake of the newly elected A.S.M. vice-president and founder member, has been made Ohio representative for Park Chemical Co., with headquarters in Cleveland. Young Woodside was formerly with Timken Steel and Tube Co.

ON Oct. 14 the resignation of CARL O. GRAVES as vice-chairman of the Cincinnati Chapter A.S.M. was announced at the regular meeting. On the strength of his resignation a special Executive Committee meeting was held and KURT SIEMS, engineer, Cincinnati Milling Machine Co., was chosen to fill the vacancy. He was also made chairman of the Meetings and Papers Committee in place of Mr. Graves.

Mr. Siems then resigned as chairman of the newly formed "Greeter Committee" and this position was taken by M. H. BRUMBLE, salesman, Queen City Supply Co. FRED J. ELLIOTT, district manager, E. F. Houghton & Co., was also appointed a member of the Greeter Committee.

A vacancy was also opened on the Executive Committee when JOHN CHIPMAN resigned from American Rolling Mill Co. to join the staff of Massachusetts Institute of Technology. This was filled by the appointment of ROBERT J RAUDEBAUGH, Research Laboratories, American Rolling Mill Co.

* * *

ASSISTANT general manager of the Lamson and Sessions Co. Chicago subsidiary is ALEXANDER M. SMITH, a Yale graduate as recent as 1932. He received the degree of bachelor of science in industrial engineering and was a member of Tau Beta Pi, honorary engineering fraternity.

A. M. Smith

He became associated with Lamson and Sessions in the Methods and Standards Department immediately upon graduation. During the past three years and up until his new appointment, he has been in charge of the Experimental and Development Department.

Butts and Ashes Prohibited in New Hartford Auditorium

By R. J. Haigis

Hartford Chapter—Whether or not it was done intentionally for the local Chapter, the fact remains that the Hartford Electric Light Co. has constructed a new auditorium since last spring which we had the pleasure of inaugurating at the first fall meeting on Oct. 12.

Chairman H. J. Noble requested that members act as if they were at home and refrain from throwing cigarette butts and ashes on the floor. Although this request was at considerable variance with previous actions, the majority seemed to stand up under the strain and accede to the chairman's request.

After several announcements pertaining to the National Metal Exposition and the Question Box, which is to be a fixture at future meetings, George V. Luerssen, metallurgist of the Carpenter Steel Co., was introduced.

Frank R. Palmer was originally scheduled to present a talk on "Tool Steel Manufacture," but because of illness it was necessary that Mr. Luerssen take over the duty. That Mr. Luerssen did a fine job goes without saying.

After a preliminary address, the speaker showed a motion picture covering the steps in making tool steel.

At the conclusion of the picture Mr. Luerssen was kept busy answering questions dealing chiefly with methods and interpretation of deep etch, hardenability, and penetration fracture tests.

Aluminum Industry Dates From 1886

Production Steps Include Mining, Chemical Purification, Electrolysis for Pure Metal

By L. H. Nelson

Buffalo Chapter—The devolopment of the aluminum industry which dates from the discovery, in 1886, of the electrolytic process for its production, was sketched at the Oct. 14th meeting of the Chapter by P. V. Faragher, metallurgist in charge of specifications for Aluminum Company of America.

The production of the metal was described from the mining of the ore, bauxite, through the chemical purification process to produce pure aluminum oxide, to the electrolysis of the solution of the oxide in molten cryolite.

The properties of the metal were discussed particularly in relation to the uses to which it is put. Its lightness, about one-third that of other common metals, is of importance, not only where that quality is desirable for the performance of the assembly, but also because of its relation to costs in comparison with other materials.

Its resistance to corrosion and to attack by a great many chemicals and by industrial atmospheres accounts for the large tonnage used in chemical equipment and in the field of architecture.

The high reflectivity of radiant energy make its use desirable in the lighting industry. It also adds to the efficiency of aluminum foil as a material for thermal insulation. This same quality contributes to the effectiveness of powdered aluminum as a paint pigment.

The development of the newer alloys of aluminum in which strengths comparable with those of other structural materials are obtained by heat treatment has opened new fields to this versatile metal.

Lehigh Holds First Nighter With Three Innovations

By G. E. Brumbach

Lehigh Valley Chapter—The premier meeting of the season on Oct. 1 really was a first nighter from three angles: First, it was the opening meeting; second, it marked the first time that William H. Swanger of the Bureau of Standards addressed any A.S.M. meeting on the "Failure of Heat Treated Steel Wire in the Cables of the Mount Hope Suspension Bridge"; and third, it marked the innovation of coffee speakers at the Chapter dinners.

Stewart Hockenbury, Princeton '31, gave the first coffee talk on versions of football rules. The Chairman expects to adopt some of the newer rules for conducting future A.S.M. meetings.

A large number of the 150 men present at the meeting were engineers from John A. Roebling's Sons Co., American Steel & Wire Co., and the Williamsport Wire Rope Co. Their presence showed the interest aroused by Mr. Swanger's talk which gave the results of hundreds of Bureau tests on the wire that had been taken from this bridge.

The greater part of Mr. Swanger's material was published in METAL PROGRESS, August 1936.

Selection of Steel Presents Baffling Problems to Users

By M. J. Donachie

Springfield Chapter came to quick life for the current year on Sept. 20, when the first meeting was held at the Hotel Worthy. Secretary M. J. Donachie announced a full calendar of activities for the coming year, and the meeting was then turned over to S. C. Spalding, metallurgist, American Brass Co. and a trustee of the A.S.M.

That the speaker and his subject, "Specifications and Selection of Tool Steel," had aroused the interest of the Springfield group was reflected in the overflowing attendance at this meeting, in spite of the fact that the Eastern States Exposition was also holding the spotlight.

Mr. Spalding showed that the problems facing the user of steel are many and baffling.

An analysis of the necessary factors for proper selection, including not only stock type steels but also the occasional and necessary special steels, was given.

The many pitfalls that are to be encountered in setting up specifications were pointed out and the importance of standardizing on procedure and technique was properly emphasized.

A number of slides illustrated excellently the difference in form of specification writing, the test methods used, and the interpretation of test results. That more than the screen was being illuminated could be readily seen from the attentive attitude of the audience.

New Telescope 200-In. Mirror Coated With Al

California Tech Will Operate Mt. Palomar Telescope Now Under Construction

By E. C. Black

Los Angeles Chapter—The history of the Mt. Palomar 200-in. telescope started the very day the 100-in. telescope atop Mt. Wilson, California, was completed, said Mark Serurrier, assistant engineer in charge of structural design of the telescope, speaking at the meeting on Sept. 23.

Ten years after completion of the Mt. Wilson telescope the Rockefeller Foundation offered to finance the construction of a larger telescope providing some organization would guarantee to furnish the necessary funds for its operation.

An agreement was made with the California Institute of Technology to undertake the construction, and later to operate the huge telescope. The Carnegie Foundation agreed to render every possible aid.

Location Was Problem

The first problem was the location for the telescope which was determined by means of tests in various sections of California made with small telescopes. The location had to be an isolated section of the country away from city lights, with a mild climate because the observers have to work in a dome with the temperature as nearly equal to that of the outside air as possible.

Palomar Mountain, the final choice, is about 35 miles from Escondido, the nearest town, and is in a section of the country that will probably never become densely populated.

The telescope is of the reflecting type, the prime focus being approximately 55 ft. from the mirror. By using secondary mirrors intercepting the light rays inside of the prime focus, the other optical combinations may be used at will, namely, Cassegrain and Coudé.

At the focus of the three or five-mirror Coudé system, an image of the moon would be approximately 52 in. in diameter if the entire moon could be seen at one time. Mechanical and optical clearances limit the size of a single picture to 8 by 10 in.

The mirror will weigh approximately 33,000 lb. In the rough state it weighs 40,000 lb. The face slab of the glass when completed will be 4 in. thick. The total thickness, including the shell, will be 24 in.

36% Nickel Steel Used

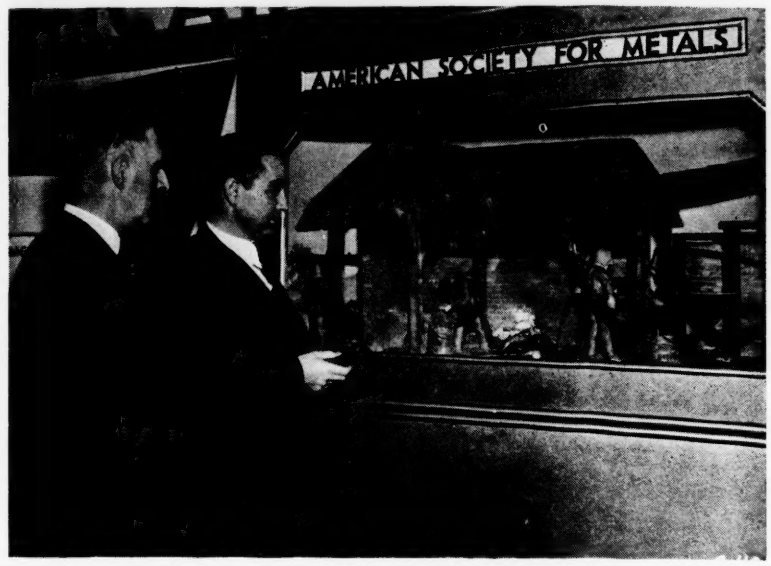
The back of the mirror has 36 pockets in which compensators will be placed for supporting the glass. This will give the glass a floating effect in all positions. The compensators are made of 36% nickel steel castings having the same coefficient of expansion as that of Pyrex glass.

The surface of the mirror will be covered with aluminum by a process devised by John D. Strong of Cal-Tech. This coating will be applied in a vacuum chamber. Inside this chamber are electrical heating units. A steel bell jar is to be placed over the mirror and the heat from the heating elements will cause the aluminum to vaporize, forming fine, minute particles which fall and cover the surface of the mirror.

Mr. Serurrier accompanied his talk with slides showing the different phases of the work of the telescope mounting at the Westinghouse Electric & Mfg. Co. in Philadelphia, and the erection of the telescope dome at Mt. Palomar.

Snapped at Recent National Metal Congress

Standing in Front of the A.S.M. Metal Man Are New Trustee Gill, Secretary Eisenman, President Waterhouse, Vice-President Woodside, and Retiring President Bain



President Waterhouse and Campbell Lecturer Sykes Inspecting One of the Animated Dioramas at the A.S.M. Booth at the Exposition

Everybody Seemed Happy During the Annual Meeting of the Society When Retiring President Bain Presented the President's Bell to W. B. Coleman, Who Accepted it on Behalf of the Philadelphia Chapter. Left to right: Mr. Coleman, Secretary Eisenman (in background), and E. C. Bain

Dayton Chapter Investigates Its Bridgework at First Meeting of Season

By L. H. Grenell

Dayton Chapter—An interesting discussion of the history of dentistry by H. F. Heston, president of the Dayton Dental Society, prefaced the meeting on Sept. 8, at which members of the Dental Society were guests of the Chapter.

The principal speaker of the evening was O. E. Harder, Battelle Memorial Institute, whose talk skillfully blended metallurgy for dentists and dentistry for metallurgists.

Dr. Harder traced the use of metals and alloys in dentistry from the early days when cavities were filled with tin, lead and gold in non-cohesive form, used as foil which was condensed in the cavity. The introduction of cohesive gold was one of the first improvements, and required the use of gold of high purity previously not available.

At about the same time, amalgams came into use, causing the "Amalgam War." Some practitioners opposed the use of mercury, but the use of amalgams was later approved.

In making an amalgam filling, the dentist prepares an alloy consisting essentially of a silver-tin intermetallic compound and mercury. It has been found that the use of this silver-tin compound produces an amalgam with greater strength and hardness than other silver-tin alloys. Most of these amalgam alloys contain small amounts of copper and zinc.

In a discussion of the physical properties of amalgams, the effect of the time of trituration and the expression of the excess mercury was shown. These amalgams when properly prepared show crushing strengths as high as 70,000 psi.

A large number of gold and platinum alloys for inlays and bridgework are on the market, some containing gold, silver, platinum, nickel, zinc and copper.

It is possible to develop very high strengths in these alloys, particularly those which may be heat treated. These alloys are soft and workable when quenched and are hardened by aging at a temperature below the quenching temperature.

Dr. Harder showed that with the metals now being used, over eight million alloys are possible.

A lively discussion followed the talk by Dr. Harder, both dentists and metallurgists participating. This brought out the fact that the stainless steel used for casting dentures is not the stainless steel the metallurgist usually thinks of, but a highly complex alloy of the stellite variety.

Aluminum alloys are also entering the dental field because of their lightness.

Centrifugal Casting Requires Precaution Against Cracking

By H. P. Munger

Mahoning Valley Chapter — The Chapter chairman for the coming year, B. F. Anthony of Youngstown Sheet and Tube Co., was the speaker at a dinner meeting on Monday, Sept. 13, at the Tod Hotel in Youngstown. His subject was "Centrifugal Casting of Tubes."

In casting tubes centrifugally, care must be taken to prevent both longitudinal and transverse cracking. In the initial chilling of the shell, the thickness and strength must be sufficient to prevent cracking along the length of the tube due to the centrifugal pressure of the molten metal. Transverse cracks result from the tube ends being restrained, preventing normal shrinkage.

It is necessary to pour the steel into the rotating mold at the right temperature, rate, and mold rotational speed in order to secure a sound casting. As an example of the time required, the steel may be poured in a 13-in. diameter mold in 50 sec., solidified in 5 min., and stripped immediately.

In these castings, a silicon killed steel is normally used. Aluminum killed steel will also give sound castings. If rimming steel is used, however, a marked porosity is encountered. It has been found almost impossible to cast solid ingots in this manner because of the pipe that is created upon solidification shrinkage.

Among other advantages attributed to centrifugally cast hollow shells for seamless tubes are uniformity of wall thickness and rapid conversion of molten metal to finished pipe.

Bearings Illustrated

Swartz Shows Photos, Micros and Charts of Various Types of Bearing Materials

By Ray P. Dunn

North West Chapter—The second meeting of the 1937-38 program of the Chapter was held on Oct. 12 in the Memorial Union of the University of Minnesota, with Carl E. Swartz, chief metallurgist of the Cleveland Graphite Bronze Co., as the guest speaker.

His subject, "The Development in the Manufacture of Automotive Bearings," was illustrated with slides of Leica photographs of the various steps along the production line in the manufacture of a bearing, as well as photomicrographs and composition charts illustrating the various types of bearing materials commonly used in the automotive industry.

Dr. Swartz presented the steps in the development from the early gravity cast babbitts and centrifugally cast babbitts (both with bronze backings) up through the steel-backed tin-base babbitts, lead-base antifriction, copper-lead, cadmium-nickel, and cadmium-silver bearings.

The characteristics, applications and suitability of these various bearings were presented in a thorough and interesting manner.

What Corrosion Does to Metals

By Frank N. Speller
Director of Research
National Tube Co.
Pittsburgh

This is an Abstract of the Fourth Lecture of the Philadelphia Chapter Course on "Metals—How They Behave in Service." The first three lectures appeared in the May, June and August issues of THE REVIEW and subsequent issues will carry the others in this series of six.

CORROSION is the result of interaction between the metal and its environment. It is not one problem but a combination of many problems, some of which are quite complicated. The solution should be economic, the objective being to select the most suitable metal or treatment of the metal or environment that will give the desired service at the lowest ultimate cost. The tonnage of steel products is nearly 20 times that of all other metals together. Low cost and wide use of steel often bring it into fields where the prevention of corrosion is of fundamental importance. It is quite natural that the solution of this important problem has attracted the attention of many investigators with fruitful results.

Mechanism of Corrosion

Most of the common metals are essentially unstable in certain environments and tend to revert to their more stable compounds with release of free energy. The reaction may be by direct chemical attack, as in the oxidation of aluminum or iron in low humidity air at normal or higher temperatures. However, corrosion usually occurs in the presence of water and in that case nearly always takes place by electrochemical action in which the driving force is the tendency of the metal to enter solution. Most corrosion in air, water, or soil is of this type, and Dr. Speller described in non-technical terms the essential features of electrochemical reactions in corrosion.

Where two metals are placed in a conducting solution and connected in the air by a wire with a millivoltmeter in the circuit, the current flows through the solution from the one that has the greatest tendency to go into solution to the other. The former is known as the anode and the latter as the cathode. Metals can be arranged approximately in the order of their tendency to dissolve in solutions of their salts. For example, the following metals are so arranged but the order will vary somewhat with the environment:

(Anodic) Mg, Al, Zn, Fe^{++}, Cr-Fe (active), Sn, Pb, Ni, H, Cu, Cr-Fe (passive), Ag (Cathodic)

When a metal enters solution, another metal in the electrolyte is displaced and plated out on the cathode.

For example, if iron and copper are connected together in a copper-sulphate solution, iron dissolves and copper is observed to plate out on the cathode as in the well-known Preece Test. The metals to the left in the above series tend to displace in solution those to the right of them. If, on the other hand, two pieces of a metal such as iron are connected in a saline solution, one is pretty sure to be anodic, and hydrogen, which acts as a metal, is displaced by iron and deposited as an invisible film on the other, the cathode.

The above illustration indicates exactly what goes on when a solid piece of metal is placed in water. Certain areas are anodic to others and a current immediately flows from one to the other. The anodic and cathodic reactions are equal and interdependent (like two valves in a water pipe) so that if one is restrained, the other is also and corrosion is retarded or accelerated as the case may be. The hydrogen layer on the cathode indirectly impedes corrosion at anodic areas and if not removed will finally stop the solution of iron by polarizing the cathode. Hydrogen is removed either by evolution as gas or by combination with free oxygen. The initial corrosion process can also be restrained by a deposit on the anodic area that will obstruct the flow of metal ions from the anode to the solution.

Secondary Factors

It will be seen from Fig. 1 that the initial reactions of corrosion are quite simple but this only indicates the tendency of the metal to react. However, there are many secondary factors affecting the reactions at either the cathode or anode or both, that finally determine the rate of attack over a long period of time. There is now general agreement on the mechanism of corrosion, but much has yet to be learned about the details of the secondary reactions before this "disease" of metals can be said to be under control. In fact one of the most important factors tending to lower the rate of corrosion in water is the tendency to form films on the anode or cathode that slow down solution of the metal or prevent diffusion of oxygen to the cathode. Passivating reagents, such as chromates, silicates, phosphates, etc., are classed as anodic inhibitors, and deposits of silt, colloids, or calcium carbonate which interfere with the diffusion of oxygen to the cathode restrain the cathodic reaction; the films that form in certain media on metals like aluminum or stainless steels have a controlling influence on the rate of attack where the film is stable and more or less impermeable. Natural protective films do not need to afford everlasting life to the metal; that is usually too expensive.

The average rate of destruction of the metal, however, is not so important as the distribution of attack. This is controlled by another set of factors which may be referred to as "contact effects." These include differences in concentration of materials in solution, dissimilar materials or metals in contact, or differences in the rate of flow of a solution over the metal surface, all of which cause differences in potential. When one area of a metal is shielded from free oxygen in solution, it is anodic to other areas that are more accessible to oxygen. This is one of the most common causes of pitting. Under such conditions, a metal may fail by perforation before it loses 5% of its weight.

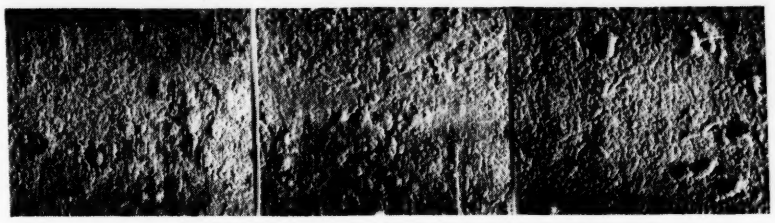


Fig. 2—Typical Surfaces of Ferrous Metals Exposed to Rather Severe Soil Corrosion (From Bureau of Standards' Soil Tests). Left is wrought iron—depth of deepest pit, 77.5 mils. Center is open-hearth steel—depth of deepest pit, 114.5 mils. Right is cast iron—depth of deepest pit, 145 mils.

Fig. 1—Initial Reactions of Corrosion of Iron in Water

(1) $Fe + 2H^{+} \longrightarrow Fe^{++} + 2H$
Metallic Ionic Ionic Atomic

(2) Cathodic Reactions:

(a) $2H \longrightarrow H_2$
Atomic Molecular

(b) $2H + \frac{1}{2}O_2 \longrightarrow 2H_2O$
Atomic (Regenerated)

(3) Anodic Reaction:

$Fe^{++} + A^{--} \longrightarrow FeA$
Sparingly Soluble

(4) Non-Electrode Reaction:

$xFe^{++} + y(OH)^{--} + zO_2 \longrightarrow [Rust] + wH_2O$
(Regenerated)

Of the secondary factors it is quite true that films or deposits on the surface of metals have usually more to do with the rate and distribution of corrosion than any other factor.

It is difficult to separate the influence of the metal and the environment, especially with respect to the influence of surface films or deposits of corrosion products. It must also be evident that no one of the common metals or methods of treatment of environment will be effective under all conditions. The common factors that affect corrosion are listed below with respect to their association mainly with the metal or the environment:

Factors Associated With the Metal

1. Effective electrode potential of a metal in a solution.
2. Overvoltage of hydrogen on the metal.
3. Chemical and physical homogeneity of the metal surface.
4. Inherent ability to form an insoluble protective film.

Factors Associated Mainly With the Environment:

1. Hydrogen-ion concentration (pH) in the solution.
2. Influence of oxygen in solution adjacent to the metal.
3. Specific nature and concentration of other ions in solution.
4. Rate of flow of the solution in contact with the metal.
5. Ability of environment to form a protective deposit on the metal.
6. Temperature.
7. Cyclic stress (corrosion fatigue).
8. Contact between dissimilar metals or other materials as affecting localized corrosion.

These factors do not always operate in the same way and when they operate together the result is often different. For example, excess oxygen in the atmosphere forms protective films on aluminum and stainless steel, but in water protective films do not form so readily and the rate of corrosion of plain carbon steel is usually proportional to the oxygen content; or in other words, the rate in this case is controlled by the amount of oxygen available at the cathode surface for the removal of hydrogen. Velocity of flow in solution tends to bring more oxygen to the cathode and also removes metal ions from anodic areas. Therefore, it usually accelerates the average rate of corrosion of iron in water. However, after the velocity passes a certain point, so much oxygen is available that a gelatinous layer of ferric hydroxide may form over the surface and retard the rate of attack. At still higher velocities, erosion may remove this film and the rate of attack on the metal increases again. Where there is a variable velocity through an iron pipe, the area exposed to the higher velocity receives more oxygen and becomes cathodic to adjoining areas under low velocity. On the other hand, with copper the reverse is found—the areas subject to the higher velocity are anodic due to the greater rate of removal of metal ions, which is the controlling factor in that case.

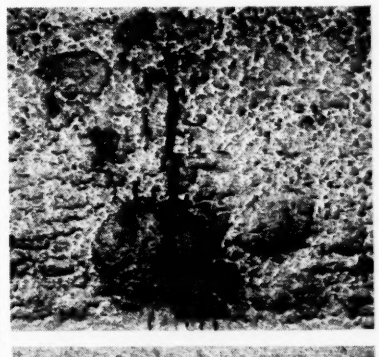
Types of Corrosion

As factors having to do with the environment usually control the rate and distribution of corrosion, it is convenient to classify the common types into atmospheric, water, and soil corrosion. In the atmosphere, relative humidity and the presence or absence of solid particles dominate. In water, oxygen concentration and film-forming constituents, temperature, and velocity of flow are the important controlling factors. In moist soil, contact effects, electrical conductivity, and total acidity dominate. The stability of protective films is much more pronounced in atmospheric corrosion so that even a small amount of copper added to iron has quite a marked effect in retarding corrosion. Therefore, it is not surprising to find that many of the metals and alloys give satisfactory life without other protection in some atmospheres.

Metal surface films are, as a rule, much less stable in water and very much less so in soils than in atmospheres. However, the development of special low-cost ferrous alloys for service in water has only begun. Copper steel does not last any longer than plain carbon steel in water, but when it contains a small amount of phosphorus, silicon, and chromium, its resistance in salt or fresh water is increased two or three times. A more thorough study of the effect of these additions in typical waters is now under way. Underground, even such metals as high chromium steels, lead, and copper often suffer severe pitting.

Corrosion Prevention

The various methods of corrosion prevention aside from *(Cont. on page 8)*



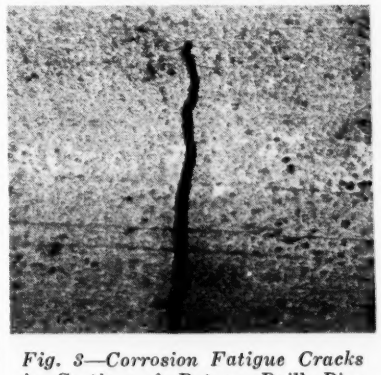


Fig. 3—Corrosion Fatigue Cracks in Section of Rotary Drill Pipe Showing Both Inside View (Above) and Outside View (Below)

Combined Castings And Weldings Make Superior Structures

By D. R. Howerton

Chicago Chapter—Health was described as a man's greatest and most valuable possession by Dr. H. N. Bundeson, dynamic and energetic president of the Board of Health, City of Chicago, in a coffee talk before the Chapter on Oct. 14.

Dr. Bundeson emphasized the importance of a complete annual physical examination, pointing out that a man never dies instantly from heart trouble but instead begins to die years before his actual death.

Following the talk by Dr. Bundeson, Technical Chairman John L. Burns introduced the lecturer for the evening—H. J. Shiffli, welding engineer, American Steel Foundries, Hammond, Ind., who spoke on "The Use of Castings in the Assembly of Heavy Welded Structures."

Through recent developments and advances made in the science of welding, one may tend to divorce the idea of castings in welded structures; nevertheless, it was pointed out by Mr. Shiffli, there is great advantage in combining the two in numerous cases, not only to decrease the cost of assembly but also to give a superior product in the end. Numerous slides were shown to emphasize both of these points.

Corrosion of Metals

(Cont. from pg. 7) increasing the thickness of the metal may be divided into three classes. First is alloying the metal so that in certain environment it will form a more stable self-healing film. Where chlorides or marked differences of potential occur and under some other conditions, it is difficult to do this at reasonable cost. The symposiums on metals and corrosion conducted by the American Chemical Society and the American Society of Mechanical Engineers in 1936 contained a fairly complete summary to date of the progress in development of metals resistant to corrosion.

The second method includes treatment of the environment. Examples are boiler water conditioning and deaeration, the use of passivators and neutralizers, and cathodic protection, which is now becoming a useful auxiliary protection for underground pipe lines.

The third type of protection includes artificial protective coatings of all kinds, such as paints, Portland cement, bituminous coatings, and natural deposits of silts or colloids that often materially impede corrosion. For example, water filtration has considerably increased the corrosion problem in domestic water systems.

Conclusion

A certain analogy exists between diseases of metals and humans. They are both very susceptible to unfavorable environment. Metals live longer when kept clean and moderately busy. A certain degree of responsibility should be placed on the engineer for proper care of metals. For example, if condensers and heat exchangers were designed so as to be more readily cleaned, their life would be much longer, as failure is often due to pitting under occasional deposits of foreign, inert matter that lodge on the metal, causing differences of potential. Many cases of pitting of pipe lines in soils are due to the same cause.

Nearly every engineer has, sooner or later in his life, something to do with corrosion problems and it would seem that most of our technical institutions could well devote a certain amount of their time to fundamental research along these lines and to the educating of the senior classes in the fundamentals of these problems.

Analysis of Chapter Educational Courses

CHAPTER	MEMBERSHIP†	SUBJECT OF COURSE	NO. OF LECTURES	ENROLLMENT	AV. ATTENDANCE	REMARKS	PLANS FOR 1937-38
Baltimore	70					No direct sponsorship of courses but worked closely with Johns Hopkins University on free elementary metallurgical course.	Three educational meetings to tie in with some of regular lectures.
Boston	261	*Gill's Tool Steels	5	207	186	Over 60 new members attributed to the three courses directly or indirectly.	A shorter series of lectures, starting with fundamentals and working up to more intricate operations in heat treating.
		*Churchill's Physical Testing	5	207	167		
		*Grossmann's Principles of Heat Treatment	5	207	138		
Buffalo	153	*Grossmann's Heat Treatment of Steel	7	...	125		Details not yet complete.
Chicago	851	Fundamental series on metallurgical principles, processes	10	...	150		Fundamental course planned similar to preceding one.
		Two seminar courses on advanced subjects	2	...	50		
Cincinnati	149	Applied Welding	5	...	20	These five courses were actually educational discussion groups rather than formal lecture courses. They were held simultaneously, although the groups met on different nights in order to accommodate those enrolled in more than one group. Each meeting was conducted by a competent discussion leader.	Similar educational groups are being organized this year on Foundry Practice, Tools, Advanced Metallurgy, and Gears. In addition the Bates course is being presented with 68 enrolled, including 24 new members.
		Fuels & Furnaces	6	...	20		
		Theoretical and Advanced Metallurgy	6	...	15		
		Cast Iron	5	...	10		
		Oils and Lubrication	6	...	10		
Cleveland	719	Service Failures	4	151	130	Of total attendance, 65% was metallurgical, 19% sales, 11% executives, balance students. Discontinuity of speaker and subject objectionable.	Gill's course on tool steels in the fall (5 lectures) and "Forgings" (6 lectures) by Waldemar Naujoks in the spring. Also two discussion meetings.
		*Bates' Fundamentals of Ferrous Metallurgy	6	224	199		
Dayton	68	No course	...	...	...		Bates' Fundamentals of Ferrous Metallurgy to start in January.
Detroit	611	Engineering Alloy Steels	6	...	68	Attendance at previous courses on Spectrograph and X-ray was 300 and 250 respectively, indicating that subject is more important than method of conducting course.	Five lectures on protective coatings in fall; controlled atmospheres tentative subject for spring.
		Non-Ferrous Metals	6	...	58		
Golden Gate	169	Non-Ferrous Metallurgy	18	...	45	All are practical courses given at the Samuel Gompers Trade School.	These same courses to be sponsored again this year, and also a series of five educational lectures is being considered for next spring.
		Practical Steel Metallurgy	18	...	65		
		Non-Ferrous Laboratory	...	...	16		
		Elementary Ferrous Laboratory	...	...	17		
		Advanced Ferrous Laboratory	...	...	12		
Hartford	141	No course	...	...	...	Monthly discussion groups found more satisfactory than formal lecture course.	
Lehigh Valley	189	No course	...	...	...	Geographical layout does not lend itself to usual type of educational courses.	New plan being attempted, but details cannot yet be released.
Los Angeles	204	Cast Ferrous Metals	10	73	58	16 new regular members and 2 sustaining members as result of course.	"Heat Treatment of Steel and Iron" to be given based on Keller book.
Milwaukee	221	*Grossmann's Heat Treatment of Steel	5	...	95		Five lectures on "X-Ray in Theory and Practices."
Montreal	202					Gill's Tool Steel course planned last fall but prevented by illness of lecturers.	Gill's Tool Steel course to be given.
New Haven	181	*Grossmann's Principles of Heat Treatment	3	...	60		Five lectures of very practical nature on heat treatment of tool steel and microscopy.
		Aluminum and Its Alloys	2	...	45		
New Jersey	458	*Metallurgy and Heat Treatment of Ferrous materials	8	...	97	Partially based on Grossmann course.	Tool Steels is the subject of 7 lectures, partially based on Gill's course.
		Properties and Applications of Non-Ferrous Materials	6	...	65		
New York	320	Ferrous Metallurgy	6	...	60		A series of 8 lectures, not a connected series of talks but filling in some of the gaps not covered in the two previous years.
		Non-Ferrous Metallurgy	6	...	60		

*Based on courses provided by the National Office of the Society.

†Membership as of Jan. 1, 1937, most closely approximating average for the ten-month season.

Analysis of Chapter Educational Courses

CHAPTER	MEMBERSHIP†	SUBJECT OF COURSE	NO. OF LECTURES	ENROLLMENT	AV. ATTENDANCE	REMARKS	PLANS FOR 1937-38
North West	97	Heat Treatment, Welding, Cast Iron, Non-Ferrous, Tests	6	56	45	Lectures were held at various plants where actual operations were observed.	Two courses to be held, one on ferrous and one on non-ferrous metals.
Ontario	225	*Churchill's Physical Testing	5	100	...	Course conducted both in Toronto and in Hamilton.	Subject of course to be chosen after Convention.
Peoria	331	Principles of Welding	10	...	160		Five lectures on Steel Making; subject for spring undecided.
		Principles of Metal Casting	10	...	150		
Philadelphia	492	Heat Treatment and Metallography of Steel	30	...	...	Sponsored at Temple University. Laboratory course optional.	Temple University course presented annually.
		Metals—How They Behave in Service	6	...	200	A practical course, currently being published in THE REVIEW.	Subject for evening course not yet announced.
Pittsburgh	725	Raw Materials to Finished Products	12	163	62	Also had 5 or 6 Shop Group meetings with average attendance of 50.	Fundamental series of 12 lectures; four Shop Group meetings; and 2 meetings on Machinability of Metals.
Rochester	212	Manufacture of Metals and Alloys	23	120	93	Fundamental theory underlying practical applications.	Identical program.
Rockford	74	*Churchill's Physical Testing	5	...	20		Plans not yet made.
Southern Tier	44	*Grossmann's Principles of Heat Treatment	4	...	300	Actually sponsored by International Business Machines Corp. with co-operation of the A.S.M.	The same course to be repeated.
Springfield	43	*Bates' Fundamentals of Ferrous Metallurgy	6	...	17		Question Discussion Night once a month.
St. Louis	114	Heat Treatment of Steel	12	...	12	Sponsored at David Ranken School of Mechanical Trades	Similar course.
Syracuse	73	No course	...	...	...		Bates' course of 8 lectures. Anticipated attendance of 75 to 100.
Texas	65	Steel Manufacture, Fabrication and Heat Treatment	...	...	60	Course is based on Keller book. Was started last March and continued through the summer.	Continuation of course covering fabrication and heat treatment.
Tri-City	120	*Grossmann's Principles of Heat Treatment, Testing, Metallography, and Foundry Metallurgy	14	...	30	Course consisted of too many lectures and became a burden, with attendance dropping off toward the end.	Six lectures on miscellaneous subjects.
Washington	158	Physical Metallurgy of Non-Ferrous Metals	8	...	100	Essentially elementary discussions of principles of physical metallurgy and applications to study of specific types of metal.	Six lectures are planned as a continuation of the course on fundamentals of physical metallurgy.
		Physical Metallurgy of Ferrous Metals	6	...	75		Three additional lectures to be on non-ferrous subjects.
Worcester	70	*Ferrous Physical Metallurgy (based on both Bates and Grossmann courses)	28	...	45	Course given at Worcester Polytechnic Institute. 27 new members acquired.	Similar course planned supplemented by Gill's course on Tool Steel.

*Based on courses provided by the National Office of the Society.

†Membership as of Jan. 1, 1937, most closely approximating average for the ten-month season.

Employment Service Bureau

Address answers care of A S.M., 7016 Euclid Ave., Cleveland, unless otherwise stated

Positions Wanted

STUDENT METALLURGIST: Desires position in chemical or metallurgical laboratory with opportunity to study. Almost two years experience in engineering college. Will locate anywhere. Box 11-5.

FOUNDRY ENGINEER: Young technical graduate with foundry experience in metallurgical and production control. At present employed on methods to increase production and reduce cost in malleable and gray iron foundry. Married and wishes to enter field of greater possibilities. Box 11-10.

EXPERIENCED FOUNDRYMAN, metallurgist, superintendent, or manager, cupola, electric furnace, and converter practice. Gray, high strength, alloy, and malleable irons. Production or jobbing work. Heavy, medium, and light work. B.S. and M.S. degrees in metallurgy. Best of references. Available at once. Box 11-15.

METALLURGIST: Penn State graduate 1926. Experienced in laboratory investigations in metallography, physical testing, heat treatment, X-ray radiography, laboratory welding and weld testing. Box 11-20.

METALLURGIST: Technical graduate, ten years professional experience in U. S. Government research and testing laboratory, desires change in location. Box 11-35.

ELECTRIC FURNACE DESIGNER: Four years development and research experience in heat treatment and metallurgy of high carbon steels and spring wires. Also some knowledge of sales. College graduate. Box 11-40.

COLLEGE GRADUATE: B.S. in metallurgy; four years experience in carburizing, heat treating and control laboratory work. Desires a permanent connection which offers future possibilities. Now employed. Box 11-50.

METALLURGIST: With general steel plant experience. Chemical and physical laboratories, complaint work and railroad inspection. 33 years of age. University training. Box 11-45.

Positions Open

METALLURGIST: Graduate, with experience to conduct laboratory and shop studies of ferrous and non-ferrous alloys and heat treating processes in large manufacturing plant located in the Chicago area. Give full particulars including age, education, experience, technical publications, salary expected, and small snapshot. Box 11-25.

ASSISTANT ENGINEER OF TESTS: To understudy present engineer of tests. Metallurgical engineer between 30 and 40 years old, with considerable experience after graduation, preferably in the steel industry. Citizen of United States. Excellent opportunity. Box 11-30.

Background for Lecture Course Prepared by Hill Reviewing Steel History

By David R. Howerton

Chicago Chapter inaugurated its fall session of educational lectures on Oct. 7.

In preparing a suitable background for subsequent lectures, C. C. Hill of the Carnegie-Illinois Steel Corp. spoke on "Steel Making, Past and Present."

Chairman Elmer Gammeter opened the meeting with a word of welcome and introduced Roy G. Roshing, metallurgist, Lindberg Steel Treating Co., chairman of the Educational Committee, who announced future meetings.

Mr. Hill then reviewed the early methods of steel making, which included the method of mixing ore and charcoal together and firing the mass on an open hearth and obtaining a pasty mass which could be readily worked under a hammer.

The development and introduction of the bellows was discussed and slides illustrating its early use were shown.

The introduction of the bessemer process, the puddling furnace and the open-hearth furnace were discussed and the principles of each reviewed.

Graphitic Steel Now Produced In All Shapes

New Developments in This Material Arouse Great Interest in Cincinnati

Cincinnati Chapter—A subject which has created a great deal of interest in Cincinnati was discussed at the meeting on Oct. 14 by F. R. Bonte and G. A. Stumpf, metallurgists, Steel and Tube Division of Timken Roller Bearing Co.

This was "Graphitic Steel" a material which combines the machining, wear resisting, and frictional properties of cast iron with the uniform structure, response to heat treatment, and good physical properties of steel.

An article in METAL PROGRESS last April covered much of the material contained in this talk, but some new data were presented and will be reviewed here.

Graphitic steel is melted in the electric furnace, from a good grade of scrap, and is poured into 19 or 21-in. corrugated ingots, using a special technique in both operations.

After cooling in the molds, the ingots are charged into a soaking pit and heated to not over 2000° F. They are then rolled into blooms of various sizes and later rolled into billets and bars as required.

All difficulty in hot working graphitic steel has been overcome and today it is possible to produce it in any of the standard bar sections, as well as seamless tubing, strip, sheet, weldless rings, and in all the various types of forgings.

The principle involved in the hot working of this new material is to keep the carbon content largely in the combined form.

Metal Forming

In endeavoring to improve this product for use as a bar and tube drawing die, it was discovered that quenching from 1475 to 1500° F. with a stream of water through the hole gave an increase in hardness which after a 300° F. temper left the die working surface at Rockwell C-65 to 66, which shows very gratifying life.

Another production application is brake drums. For this part the ability to withstand the severe abrading action of the brake shoes and the fact that any wear is in the form of finely divided metal which does not ball up or cause scoring or galling fills the service requirement.

There are also any number of other uses for this new steel, such as grinding wheel spindles, work blades for centerless grinders, gages of all kinds.

Newest Chapter Hears Talk on Heat Treatment

By C. E. Chapman

Calumet Chapter—"Heat Treatment of Steel" was the subject discussed by M. A. Grossmann, Gary-Chicago district director of research for the Carnegie-Illinois Steel Corp., at a dinner meeting held in the Woodmar Country Club, Hammond, Ind., on Sept. 14.

Dr. Grossmann's talk on the modern theories of heat treatment was well illustrated by excellent photomicrographs and proved very interesting to all. An enlightening discussion followed.

Ray T. Bayless of Cleveland, assistant secretary of the National Society and editor of the TRANSACTIONS, also spoke, outlining the growth of the organization during the last ten years. He also told of plans for the National Convention in Atlantic City.

Free Literature — Mail Coupon Below

Newer Tool Steels
Vulcan Crucible Steel Co. has a complete and attractive catalog listing their full line of tool steels including many special types to meet the modern trends in industry. Bulletin Jy-127.

Cu-Ni-Cr
A patented Cu-Ni-Cr steel made by Continental Steel Corp. is known as "Konik." Two folders describe its strength, toughness, corrosion and wear resistance, and its suitability for such applications as tire chains, fencing, ball races. Bulletin La-185.

Pyrasteel
The remarkable performance of "Pyrasteel" and "Evansteel" in parts subjected to intense heat or excessive abrasion and load is exemplified in a bulletin by Chicago Steel Foundry Co. describing castings of these materials for the cement mill industry. Bulletin La-184.

Displacement Meters
In a bulletin on rotary displacement meters the Roots-Connersville Blower Corp. describes not only the general operating principles of the meters, but also gives typical proof curves, illustrations of advanced meter design, and views of installations. Bulletin La-131.

Binocular Mike
Extremely wide field, long working distance, and stereoscopic vision are only a few of the advantages cited by Bausch & Lomb for the improved KW wide field binocular microscope. Price list and description of accessories are included. Bulletin La-35.

Ingot Production
"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Furnace Line
A distinctive direct mail piece presents for the first time in one publication Leeds & Northrup's unusual line of Vapocarb-Hump and Homo furnaces for hardening, annealing, tempering and nitriding of tools, dies and production parts. Bulletin La-46.

Dies and Tools
A. F. Holden Co. offers a booklet describing their new product, Holden Di-ard, for the heat treatment of die and tool steels. Contains interesting data on quenching media. Bulletin La-55.

P.D.M. Box Furnaces
Standard sizes and specifications for box-type furnaces, oil or gas fired, made by the Philadelphia Drying Machinery Co., are listed in a bulletin which also contains a labeled photographic diagram of the furnace. Bulletin La-150.

Insulbrix
Every high temperature furnace owner should be interested in a bulletin by Quigley Co. on a light weight, porous, cellular, low heat storage insulating firebrick known as Insulbrix. Bulletin La-139.

Vanadium Castings
A new 24-page bulletin well illustrated with more than 20 photographs contains a complete description of the properties and applications of a number of vanadium alloy steels for castings where high strength is required without excessive weight or high cost. Vanadium Corp. of America. Bulletin La-27.

Pipe Lines
Latest information on the construction of pipe lines by electric welding for transportation of oil, gas and water is contained in a bulletin by Lincoln Electric Co. Fourteen pages, profusely illustrated. Bulletin Ia-10.

Pictorial Story
A pictorial and descriptive story of the manufacture of steel products by The Youngstown Sheet and Tube Co. is in reality a textbook of basic steel information contained in a 115-page, leather-covered, pocket size ring binder. Bulletin La-93.

Insulation Products
The 1937-38 edition of the Johns-Manville Industrial Products Catalog is a 64-page book, profusely illustrated, containing a wealth of information and recommendations on high and low temperature insulations for every industrial need. Bulletin La-100.

Carburizer
Modern is the furnace and modern is the catalog which describes it. Hevi Duty Electric Co. has an exceptionally well-written, well-illustrated, and artistically printed booklet on the Hevi Duty carburizer which uses the Carbonol process. Bulletin La-44.

Super Blowpipes
Special features in the design of blowpipes giving them unusually good operating characteristics over a wide range are described in a bulletin by American Gas Furnace Co. Bulletin La-11.

Turbo-Compressors
Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Tool Steel Selector
A wall chart, 30 x 20 in., to be used as a means for selecting the proper type of tool steel is offered by Carpenter Steel Co. to tool steel users in the U.S.A. only. Bulletin Jz-12.

Potentiometer Type
Potentiometer type pyrometers, indicating, recording and controlling, are catalogued in a 48-page booklet by Brown Instrument Co., well printed in three colors. Includes the new Electr-o-Line controllers and the Brown proportioning control system. Bulletin La-3.

Aluminum Paint
A practical manual for those interested in the use of aluminum paint contains 102 pages, numerous illustrations, an index, and a chart of finishes obtainable with Alcoa Albron pigments. Aluminum Co. of America. Bulletin La-54.

High Frequency
The well-known Ajax-Northrup electric furnaces are excellently catalogued in a 22-page book, which covers all sizes and types for laboratory or shop. Includes illustrations, diagrams, tables and charts. Ajax Electrothermic Co. Bulletin Ia-41.

Hard Facing
Step by step instructions for hard facing steel with Haynes Stellite are given in an article published in pamphlet form by The Linde Air Products Co. Bulletin La-63.

Drop Stamping
A brand new forming machine known as the "Cecostamp" is being placed in production by Chambersburg Engineering Co., which successfully copes with the latest advances in sheet metal working technique. Details in Bulletin La-132.

Pyrotrol
A safety device for gas-fired ovens and furnaces has been developed by the Bristol Co. for automatically lighting gas-fired industrial heaters and for protection against explosions as a result of pilot light failure. Known as the Pyrotrol, it is described in Bulletin La-87.

EPI Microscope
The Zeiss EPI microscope for the illumination and observation of opaque material has unlimited applications for observing opaque material in dark field, bright field, and polarized light. A descriptive leaflet is published by Carl Zeiss, Inc. Bulletin Aa-28.

Thermit Welding
Of interest to all who are concerned with welding, but of particular interest to students is a pamphlet of carefully explained and illustrated laboratory experiments in Thermit welding published by Metal & Thermit Corp. Bulletin Ca-64.

Defi Rust
Analysis and descriptive notes of nine types of heat and corrosion resisting steels made by Rustless Iron and Steel Co. are contained in a handsome folder. Bulletin Ha-169.

Metal Cleaner
Chemically perfect metal cleansing prior to finishing largely accounts for the marked superiority of metal finishes today, according to E. F. Houghton Co. in a bulletin announcing No. 180 as an addition to its Houghto-Clean 100 Series of metal and maintenance cleaners. Bulletin La-38.

Chapmanizing
Chapmanizing, the new method of surface hardening steel with nitrogen, is described in a very attractive booklet of Chapman Valve Mfg. Co. Information is given out on the method itself and on its metallurgical advantages. Bulletin Ob-80.

Welding Stainless
A new 20-page booklet published by Republic Steel Corp. describes and illustrates the proper methods for welding stainless steel by electric arc, gas, seam, spot, projection, atomic hydrogen, and brazing and silver soldering. Bulletin Ka-8.

Improved Castings
The improvement of plain cast iron, nickel cast iron, nickel-chromium cast iron and nickel-chromium-molybdenum cast iron is technically presented in a 15-page article accompanied by tables, charts and illustrations. International Nickel Co. Bulletin Ka-45.

High Tensile
The 19 advantages that USS Cor-Ten steel offers to railroads and other industries are attractively presented in a 68-page book on this new low cost, high tensile steel published by United States Steel Corp. Bulletin Ka-79.

Stainless Data Book
All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc. giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Cleaning Processes
An attractive 12-page booklet entitled "Scientific Metal Cleaning" has been published by Detroit Rex Products Co. It describes in detail the applications and advantages of Detrex degreasing with Perm-A-Clor or Triad Safety Solvents and the applications of Triad Alkali Cleaning Compounds and Strippers. Bulletin Oy-111.

Heating of Metals
A strikingly printed and illustrated booklet by Surface Combustion Corp. traces the applications of heat from the ingot soaking pit to the last phases in which heat is applied to metal, and interestingly describes Surface Combustion equipment for all of these operations. Bulletin La-51.

Cleaning Rooms
A catalog of designs for blast cleaning rooms incorporating many labor and time saving improvements making the blast room an unequalled mechanical device for low cost cleaning is published by Pangborn Corporation. Bulletin Ca-68.

Mo-W High Speed
J. V. Emmons, metallurgist for Cleveland Twist Drill Co. and largely responsible for the development of the molybdenum-tungsten high speed steels known as Mo-Max, has prepared a general description of these new steels. Bulletin Ka-103.

Pyrometer Variety
An eight-page booklet by Wheelco Instruments Co. describes 13 types of indicating pyrometers and combination pyrometers and switches ranging in size from the small portable type to the large 8-in. scale wall mounted type. Bulletin La-110.

Molybdenum
Climax Molybdenum Co. presents their annual book giving new developments in molybdenum, particularly as an alloy with iron and steel. The engineering data presented are made clear by many tables and illustrations. Bulletin Dc-4.

Photoelectric Balance
C. J. Tagliabue Mfg. Co. has christened its newest, simplest and fastest recording potentiometer the "Celectray" from the photocell, electric current and light ray by means of which it operates. Described in Bulletin Ea-62.

Stainless Service
Joseph T. Ryerson & Son, Inc. has ten plants handling Allegheny stainless steel and service. A beautiful booklet describing and illustrating in color the products and services available is ready for distribution. Bulletin Jy-106.

Radiation Pyrometer
The Pyro radiation pyrometer for temperatures exceeding 1000° F. is a lightweight, handy, and simple automatic instrument made by Pyrometer Instrument Co. Its features, methods of use, and applications are given in Bulletin Ax-37.

Stiffness Testers
The stiffness test is especially valuable on materials in the form of thin sheet, strip, rod, and wire which are difficult to test by the usual tension, hardness and ductility methods. A new line of stiffness testers is described by Tinius Olsen Testing Machine Co. along with complete instructions for making test. Bulletin La-147.

Recuperators
Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Air Weight Control
An illustrated booklet of sure-fire interest to the foundry trade has been issued by The Foxboro Co., explaining in detail the advantages of the "air weight controller" which is in use at many of America's leading foundries, named in the publication. Bulletin Ea-21.

Furnace Parts
A valuable feature of Driver-Harris Co.'s folder on Nichrome cast furnace parts is a table giving the tensile strength of Nichrome castings at various temperatures. Bulletin Da-19.

Chromel
A new catalog has been issued by Hoskins Mfg. Co. covering Hoskins electric furnaces and Chromel elements, which provide uniform heat and automatic temperature control with excellent production and quality of work. Bulletin Ia-24.

Tempering
Vertical batch type tempering furnaces are described in a folder by Industrial Heating Equipment Co. Capacity and production figures and a diagram of the furnace are included along with a complete description. Bulletin Ia-168.

Hansen Control
A simple yet effective method of regulating the electrical output of the welding generator is an important factor in realizing the ideal welding arc. How the Hansen Smootharc single current control does this is described briefly but clearly by F. J. Hirner of Harnischfeger Corp. Bulletin La-171.

Model "Y"
The Sentry Model "Y" electric furnace, using the Sentry Diamond Block method of heat treatment provides exceptional quality high speed steel hardening at minimum production cost. The furnace is described in Bulletin Oy-114.

Centrifugal Castings
Centrifugal casting of stainless, heat and corrosion resisting alloys eliminates impurities and cooling strains and permits thinner and more uniform walls than any other method. This is explained in a bulletin by Michigan Steel Casting Co. Bulletin Nx-84.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Rockwell Tester
A revised and completely up-to-date catalog on the well-known Rockwell hardness tester is well illustrated and contains 24 pages. Published by Wilson Mechanical Instrument Co., Inc. Bulletin Ca-22.

Metallograph
Leitz Large Micro-Metallograph "MM-1"—most interesting 36-page publication containing numerous photomicrographs on the very latest developments in metallographic equipment. Special attention is given to darkfield illumination. Bulletin Ha-47.

Alloy Castings
Michiana Products Corp. has published a new book describing Michiana corrosion resistant and stainless steel alloys. Generously illustrated, it suggests many savings for the use of these alloys. Bulletin Oy-81.

Cutting Oils
The problems of machine tool lubrication engendered by the high speed production and close tolerances of modern industrial operations are discussed and progress in cutting oils during the past few years reviewed in a booklet by D. A. Stuart & Co. Bulletin Jy-118.

Oxidation
Designers confronted with oxidation problems connected with cracking coils, polymerization plants, superheaters, high pressure steam plants, air heating equipment and recuperators will welcome a folder by Timken Roller Bearing Co. containing data on oxidation at 1000, 1250 and 1500° F. Bulletin Ea-71.

Rustproofed Steel
Atmosphere does not corrode steel which has been rustproofed with Duozinc, a mercury-containing zinc anode with marked production properties. Full details are given in a folder issued by the R. & H. Chemical Dept. of duPont. Bulletin Ar-29.

Ni-Cr Castings
Compositions, properties, and uses of the high nickel chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Meehanite
A compact but complete specification chart gives the recommended grades of Meehanite metal for various service requirements. Complete physical properties and applications are included. Bulletin Da-165.

Tempering Furnace
Technical details and operating data on Lindberg Steel Treating Co.'s new Cyclone electric tempering furnace, which has shown a remarkable performance record in steel treating operations, are given in Bulletin Fx-66.

Electric Salt Baths
Literature is available from Bellis Heat Treating Co. describing electrically heated bath furnaces which are economical to operate and have a wide range of applications in hardening, annealing and heat treatment of high speed steel, stainless steel, nickel, aluminum, copper and bronze, etc. Bulletin Ny-48.

Laboratory Service
A new edition of "The Metal Analyst" tells about an organization established by Adolph I. Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Cr-Ni-Mo Steels
A. Finkl & Sons' new catalog is really a technical treatise on chromium-nickel-molybdenum steels for forgings. Pocket size, 104 pages, cloth bound, illustrated by photographs, charts, and tables. Bulletin La-23.

Electronic Control
Exactly how the electronic principle is used to insure exact automatic control of furnace temperature is told and full data given on the "Alnor" pyrometer controller made by Illinois Testing Laboratories, Inc. Bulletin La-180.

Uniform Temperature
Temperature Uniformity is the title of an interesting bulletin describing Carl-Mayer furnaces for tempering, drawing, aging and heat treating. With temperature uniformity so important to efficient furnace operation, every heat treater will want this literature. Write for Bulletin Ka-183.

The Review
7016 Euclid Ave., Cleveland

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The Junior Members' Own Page

What Your Chapter Can Do for You

By H. H. Lester
Chairman, Boston Chapter

[These remarks were made by Dr. Lester at the opening meeting of the Boston Chapter on Oct. 1, and contained so much which should be of interest and value to junior members that publication in these columns was felt to be warranted.—Ed.]

THE American Society for Metals provides opportunity for cementing friendships, extending acquaintances, and promoting fellowship, as those of you who have attended the chapter picnic two weeks ago can testify. It provides much more than this. It serves the older men and the younger ones, likewise. To the young man it offers a peculiar service.

Jobs are precious things, scarce, and hard to get—especially the kind you want. John Jones, trained as a metallurgist, may find himself a helper in a candy factory. Or Bill Smith, also a metallurgist, got the job he wanted, has served faithfully in a minor capacity, has earned promotion, but because there are no vacancies above him, finds himself tied to his minor job without much hope of advancement in his own company. In neither case does the job holder wish to jeopardize his present position by advertising to his boss that he is seeking a new connection. In any case, it is much more to the advantage of the man if the new job seeks him rather than that he be the obvious seeker.

Advertising Your Ability

How can the young man advertise himself to possible prospective buyers of his ability? I would advise that everyone who seeks a new job read the editorial by H. W. Gillett in the August 1937 number of *Metals & Alloys*. One way to advertise yourself is to join a technical society such as the A.S.M. and to become an active participant in its activities.

The A.S.M. brings together fellow craftsmen and others intimately connected with the industry. They know of opportunities, and in many cases are actually on the look-out for young men of promise. It is no disgrace to be a potential job hunter. Very few men have found their first job their lasting one. Most who get to the top are like Walter Chrysler whose life has been a long history of changing jobs, from apprentice boy in a railroad shop to head of a large motor corporation. It is essential to take advantage of all opportunities.

The A.S.M. offers the prospective job hunter the chance to meet and to sell himself to those who may be in a position to help his advancement. Selling himself is of greatest importance. He should take his Society seriously; he should volunteer his services. Often he can find little things to do that the older men find bothersome, such as putting up notices of meetings, helping out with the dinners, and with plant visitations. He may discover things to do of more importance, but he should volunteer for some service, however menial.

Opportunities Offered by Discussions

In addition to this, he should participate when he can in discussions. To do this he should study programs in advance and make a real effort to understand and appreciate what the speaker has to offer. It is to his advantage that the meetings be live ones. Men of importance do not care to waste their valuable time attending apathetic gatherings of half dead listeners who appear to be bored by the proceedings. He should see to it that he does his part to make each meeting a success.

I would like to leave with you this thought—both for the group that is just trying to crash the gates of industry, and for those who have already successfully entered the arena:

The American Society for Metals is your Society and mine—it has much to give. Its effectiveness in rendering the service it offers depends to a large extent upon you as individuals who attend and really constitute its meetings. You can make it a thing of vital importance or by an apathetic attitude you can destroy much of its value. I am sure that each of us desires to help.

M.S.M. Hears Story Of Cold Finishing

Films Supplement Talk, Tracing Steel Manufacture From Mine To Rolling Mill

Missouri School of Mines Group—Wm. J. Jabsen, '35, metallurgist for Bliss and Laughlin, Inc., was guest speaker at the third gathering of the year, Friday, Oct. 22, at 7:30 p.m., in the metallurgy building.

Supplementing Mr. Jabsen's talk on the "Manufacture of Cold Finished Bar Steels," were films which illustrated his subject.

The films carried the story of cold finishing from the initial mining of iron ore to its smelting in the blast furnace, transformation into steel by open-hearth furnace and bessemer converter, and formation into bars at the rolling mill.

From there on they elaborated in more detail on Bliss and Laughlin practice; the sampling of the bars, process of hot rolling, careful examination of the bars for cold milling by pickling, and then the actual cold finishing.

"Cold finishing" is done by three processes, the film showed—by drawing, by turning and polishing, and by grinding and polishing the drawn bars. Advantages of drawing over hot rolling alone, Mr. Jabsen brought out, are closer accuracy, smoother finish, advanced physical properties, and increased machinability.

Turning, however, gives only close accuracy. In other respects the bar is similar to a hot rolled one.

Upon the conclusion of the film, Mr. Jabsen went into more detail on the technical phases of his subject.

Two Meetings Feature Refractories and Foundry

By Max Bolotsky

Missouri School of Mines Group—J. J. Picco, Missouri School of Mines alumnus, and foundry engineer of the Sorbo-Mat Process Engineers, St. Louis, Mo., was guest speaker at a meeting of the Chapter on Oct. 6.

Although speaking on "Foundry Practice" as a general topic, Mr. Picco divided the subject into the following branches: "Making a Mold," "The Art of Casting," and "Furnaces Used in the Foundry."

On Oct. 7 G. D. Cobaugh of the Harbison-Walker Refractories Co., St. Louis, Mo., displayed five reels of film on the "Making of Refractories," before a gathering sponsored jointly by the M.S.M. chapters of Theta Tau and the American Society for Metals.

The Story of Steel

Al Tells Bob About The Raw Material

[This series of dialogues between Bob and Al is based upon a radio program broadcast last May featuring a trip through the Gary Works of Carnegie-Illinois Steel Corp. The series will be continued in future issues—Ed.]

"Gee, Al, that must have been an awfully interesting inspection trip your class took through that steel plant. You know what I wish you'd do? Start at the beginning and tell me all about how steel is made."

"Well, Bob, the beginning's the easiest part. And it's a long story, but maybe we can start it now and finish it some other time."

Raw Materials for Steel: Coke in Box Car; Ore in Transfer Car; Limestone in Storage Yard

"Okay, shoot."

"The making of steel really has three beginnings, Bob. That is, there are three principal natural raw materials that are necessary in making steel; they are iron ore, coal, and limestone."

"Where do they get them?"

"The iron ore comes from the vicinity of Lake Superior, in Michigan, upper Wisconsin, or Minnesota. The operation of an iron mine is very interesting, but we won't go into that now. So far as the steel mill is concerned, the important thing is that the iron ore can be brought down the Great Lakes in large boats, which carry about 12,000 tons of ore at a time."

"Yes, I've seen those ore boats, Al. One thing I've always wondered about is how much of this ore is actually iron?"

"Oh, there are many grades of iron ore. A good grade contains about 50% metallic iron."

"What's the rest of the ore, then?"

"The rest of the ore may be made up of a number of different materials. Some of them are helpful and some are not. Lime and magnesia are helpful in extracting the metallic iron from the ore, but silica, alumina, sulphur, and phosphorus are undesirable. Manganese is helpful and essential when the iron is to be converted into steel in open-hearth furnaces."

"Sounds to me, Al, as though you have to know something about chemistry to operate a steel mill."

"All the iron ore is analyzed by expert chemists at the mine and then analyzed again at the mill before it is used, to learn just how much of each of these chemical elements or compounds is present. For instance, if there's too much phosphorus, you have to use an entirely different method of treating the ore and making the steel."

"This iron ore is certainly a complicated mixture."

"Oh, not so very. You might even say that it's just a mixture of iron oxide or iron rust and waste materials or dirt."

Seven Ore Unloaders Taking 15-Ton Bites From the Hold of One of the Large Freighters

"Iron rust! You mean, Al, that the iron in iron ore isn't like the iron that we see in—well, in machinery, and iron radiators, and things like that?"

"No, it isn't, Bob. In the iron radiator you see the metal iron, while in the ore the iron is in the form of oxide of iron. That reddish brown powder that you call rust is oxide of iron, the same form of iron we have in the ore."

"How do you get the iron, then?"

"Well, as we said before, in addition to this iron rust or oxide, in the ore, we have these other materials—manganese, magnesia, lime, sulphur, silica, alumina and phosphorus. The first step necessary, then, is to separate the metallic iron from these other materials

(Continued on next page)

NEW JOBS

Many junior members who were graduated from college last spring have sent in news of their new positions. A partial list of these follows:

With Carnegie-Illinois Steel Corp.—CHARLES O. MORRIS, JR., observer in Duquesne Works (graduate of Bucknell University); WALTER C. KIMBALL, observer at Edgar Thomson Works (graduate of Michigan College of Mining and Technology); WILLIAM T. ROBINS, observer at Clairton Works; ALBERT B. CASTRO, in the observation corps.

Republic Steel Corp.—BERNARD J. KEFFLER, observer (University of Notre Dame).

Babcock and Wilcox Tube Co.—THOMAS L. HALLENBECK, engaged in training course (Massachusetts Institute of Technology).

International Nickel Co.—RICHARD A. FLINN, JR., staff metallurgist, Research Laboratory (Massachusetts Institute of Technology).

American Rolling Mill Co.—WALTER BEATTIE (University of Illinois).

General Motors Research Laboratory—L. E. SIMON, metallographer (University of Wisconsin).

American Steel and Wire Co., Cuyahoga Works—HAROLD A. DEVINCENTIS, technical apprentice (Pennsylvania State College); RONALD E. GRIFFITHS, metallurgical department (Pennsylvania State College).

Carnegie Institute of Technology—FREDERICK C. HULL, teaching assistant in department of metallurgy (University of Michigan).

U. S. Metals Refining Co.—HARRY UDIN, working in Lead Plant (Massachusetts Institute of Technology).

Chicago Metal Hose Corp.—D. WENDELL FENTRESS, development engineer (after a year's study in Europe—Lehigh University, 1936).

American Smelting and Refining Co.—E. MULLIN, research metallurgist (University of Wisconsin).

Johnson Suture Corp.—WALTER A. COX, development engineer (Oregon State College).

E. W. Bliss Co.—A. DEAN SMITH, engineering department (Purdue University).

Joseph T. Ryerson & Sons, Inc.—STUART V. CUTHBERT, JR. (Massachusetts Institute of Technology).

General Electric Co.—J. W. APPERSON, taking student engineering course (Virginia Polytechnic Institute); CHARLES F. BENNER (Missouri School of Mines and Metallurgy).

Story of Steel

(Continued from page 11)

and also the oxygen of the iron oxide."

"Then, when you want to make steel, you have to make iron first, is that it?"

"That's right. You remember when we talked about pearlite and other structures of steel? You found out then that steel is practically all metallic iron, with small percentages of carbon or other essential materials added."

"Yes, I remember, but let's get on to this business of getting the iron out of the ore."

"Okay, Bob, but don't rush me. We've got the ore now. The next thing we need to treat this iron ore in a blast furnace is coke. And if you don't know much about coke, you ought to see some big coke ovens some time. Some steel plants have nearly a thousand of them, each one about 40 ft. long, 9 ft. high and 18 in. wide."

"They sort of bake the coal in them, don't they, Al?"

"Right. The coal is brought in either by boat or trainload and is prepared and put into the coke ovens. They are built so as to be full of narrow compartments. If you can imagine a huge toaster, with a whole lot of slices of bread replaced by coal, then you can probably get the picture of the coke ovens—a layer of coal, then a red hot wall, and then a layer of coal and another red hot wall, and so on, with gas burning in flues to keep the brick walls red hot."

"But doesn't this burn the coal?"

"No, Bob, it doesn't burn because the oven is kept air tight. This baking of the coal drives off the gases that the coal contains, and these gases are burned in the flues for heating the coke ovens themselves. Sometimes they use the gas for fuel in the open-hearth furnaces, or for heating and reheating the steel before each of the rolling or forming operations."

"Well, Al, now we have the iron ore and the coke. And we need limestone, didn't you say?"

"Yes, but say, Bob, I wonder if I couldn't take you through that steel plant that our class visited the other day. It would be so much easier to explain it if you could see it."

"Gee, that would be swell!"

"I tell you—I'll see what I can do, and maybe we can finish our story with the real thing. Okay?"

"Okay, Al."

St. Louis Has First Annual Joint Cast Iron Meeting

By C. H. Morken

St. Louis Chapter, at its 1937 opening meeting Sept. 17, inaugurated what is hoped will be an annual event—a joint Cast Iron Meeting with the St. Louis District Chapter of the American Foundrymen's Association.

It was a huge success and the interest shown discloses the versatility of the erstwhile "steel treaters."

The speaker was Hyman Bornstein, national president, The American Foundrymen's Association, and director of laboratories, Deere & Co., Moline, Ill. His well-illustrated talk on cast iron was so well designed that it won the interest and enthusiastic applause of foundryman, metallurgist, executive and helper alike.

The important points brought out were that cast iron is an engineering material, made to specifications, that alloys can make a good iron better but cannot make a bad iron good, and that cast iron responds to intelligent heat treatment much as does steel.

Free Cheer Gives Buffalo Golfers Good Score

Buffalo Chapter — The annual golf tournament and get-together party was held on Sept. 10 at the Lancaster Country Club.

Even though the volatile spirits of "Hopfied Ethyl" may have undermined the determination of some golfers to break 80, yet a good array of scores was reported. Perhaps it was the free cheer served between halves and at stragetic points on the course that helped the players to achieve that desired state of physical relaxation.

The merit prize for low gross, donated annually by Brace-Mueller & Huntley, Inc., was won by J. R. Tuohey, of the Niagara Foundry Co., Niagara Falls.

The "Hotel Buffalo" Cup which passes to the kicker's handicap winner each year went to J. H. Birdsong, of the Buffalo Testing Laboratories. John is also secretary of the Chapter and since this makes the second time that he has won this cup, he now seems to assume a very proprietary attitude.

While the entertainment was not highly educational, it had some practical value in erasing trouble and care from many of the tired minds for a day at least.

November-December Calendar

DATE	CHAPTER	PLACE	SPEAKER	SUBJECT
Dec. 6	Baltimore	Engineers Club	Ira T. Hook	Copper Alloys
Dec. 3	Boston	Watertown Arsenal, Watertown, Mass.	J. M. Lessells, A. J. McDuff, and J. Kirk	Machinability
Dec. 16	Buffalo	Hotel Buffalo	W. M. Sheehan	Steel Castings and Alternate Forms of Construction
Dec. 9	Chicago	Medinah Club	Duncan P. Forbes	Cast Iron
Nov. 29	Cleveland	Cleveland Club	Clair Upthegrove	Special Bronzes
Dec. 13	Detroit			Christmas Party
Dec. 20	Golden Gate	Press Club, San Francisco		Christmas Party
Dec. 14	Hartford	Hartford Electric Light Co. Auditorium	Reinhold Schempp	Steel Inspection at the Mill
Dec. 2	Canton-Mass.	Hotel Onesto	C. L. Clark	Steel in High Temperature Service
Nov. 22	Indianapolis		F. L. Robbins	Cold Finished Steel
Dec. 20	Indianapolis		Malcolm F. Judkins	Powder Metallurgy
Dec. 3	Lehigh Valley		Edgar C. Bain	Austemping
Dec. 13	Mahoning Valley	Tod Hotel, Youngstown, Ohio	G. B. Waterhouse	
Nov.	Milwaukee	Elizabethan Room, Milwaukee Athletic Club	V. N. Krivobok	Stainless Steel
Dec.	Milwaukee	Elizabethan Room, Milwaukee Athletic Club	A. W. F. Green	Tool Steel
Dec. 6	Montreal	York Room, Windsor Hotel	David Boyd	Arc Welding
Nov. 18	New Haven	Seven Gables Inn, Milford, Conn.	R. G. Roshong	Heat Treatment in Industry
Dec. 9	New Haven	Clark Hotel, Derby, Conn.	J. L. Christie	Brass Alloys
Dec. 16	New Haven	Hotel Garde, New Haven		Christmas Party
Dec. 13	New Jersey	Essex House, Newark		Smoker
Dec. 14	North West		G. V. Slottman	Flame Hardening
Dec. 8	Notre Dame	Engineering Auditorium, University of Notre Dame	Richard Rimbach	Selection and Use of Metallurgical Literature
Dec. 3	Ontario	Royal Connaught Hotel, Hamilton	P. A. Borden	Temperature Control of Industrial Furnaces
Dec. 10	Oregon		William Prier	Non-Ferrous Bearing Metals
Dec. 13	Peoria		A. W. F. Green	Tool Steels
Dec. 3	Philadelphia	Engineers Club	A. B. Kinzel	New Departures in Alloy Steels
Dec. 10	Philadelphia			Social Evening
Dec. 9	Pittsburgh	Roosevelt Hotel		Stag Party
Dec. 13	Rochester	University of Rochester	F. R. Palmer	Tool Steels
Nov.	Springfield		Norman I. Stotz	Modern High Speed Steels
Dec.	Springfield		A. B. Kinzel	Surface Hardening and Carburizing
Dec.	St. Louis		J. P. Gill	Heat Treatment of Tool Steels
Dec. 14	Syracuse		M. W. Dalrymple	Tool Steels
Dec. 14	Tri-City	Rock Island Arsenal Auditorium	F. J. Robbins	Cold Finished Bar Steels
Dec. 2	Worcester	Sanford Riley Hall, Worcester Polytechnic Institute	E. V. Crane	Cold Working and Pressed Metal Parts
Dec. 15	York	Lancaster	H. W. Graham	Machinability

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of THE REVIEW, published monthly, at Cleveland, Ohio, for October 1, 1937, State of Ohio, County of Cuyahoga, ss. Before me, a Notary Public, in and for the State and county aforesaid, personally appeared Ray T. Bayless, who, having been duly sworn according to law, deposes and says that he is the Editor of THE REVIEW of the American Society for Metals, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations to wit:

1.—That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Society for Metals, 7016 Euclid Ave., Cleveland, O.; Editor, Ray T. Bayless, 7016 Euclid Ave., Cleveland, O.; Managing Editor, M. R. Hyslop, 7016 Euclid Ave., Cleveland, O.; Business Manager, Ray T. Bayless, 7016 Euclid Ave., Cleveland, O.

2.—That the owner is: The American Society for Metals, 7016 Euclid Ave., Cleveland, O., which is an educational institution, the officers being: President, E. C. Bain; Vice-President, G. B. Waterhouse; Treasurer, W. P. Woodside; Secretary, W. H. Eisenman; Trustees: R. S. Archer, R. L. Kenyon, S. C. Spalding, R. L. Wilson, O. W. Ellis. All officers as above, 7016 Euclid Ave., Cleveland, Ohio.

3.—That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4.—That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Ray T. Bayless, Editor.

Sworn to and subscribed before me this 1st day of October, 1937.
(Seal) Arthur T. Wehrle, Notary Public. (My commission expires Jan. 21, 1938.)